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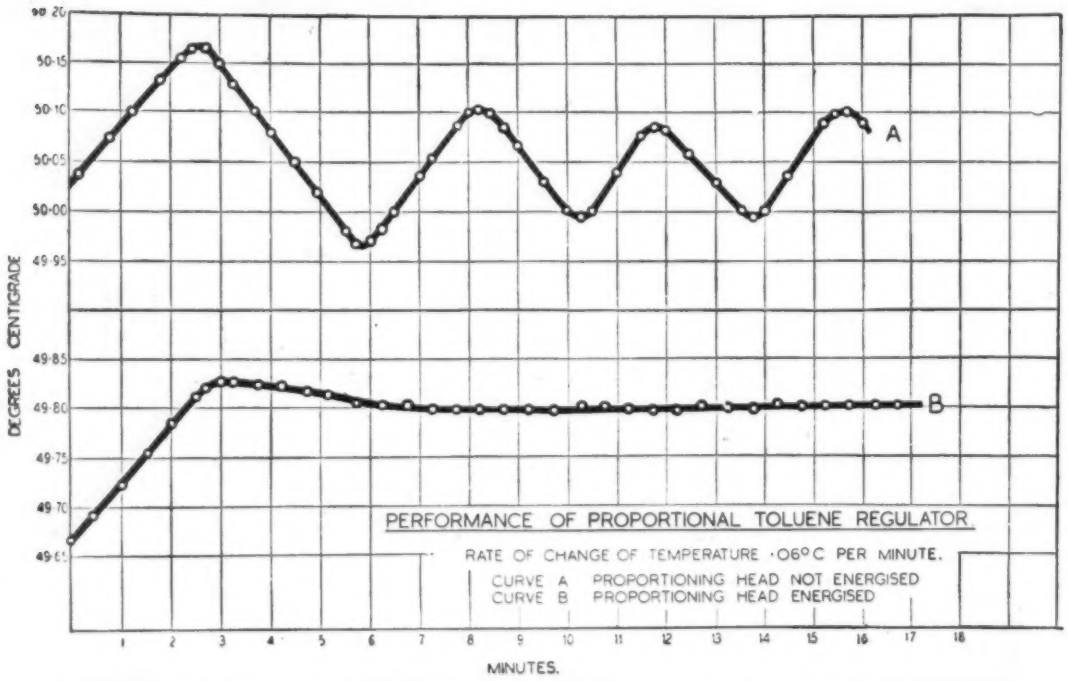

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FOOD MANUFACTURE

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1947

THE amorphous hopes of an imminent Utopia which may have gladdened the minds of the more optimistically inclined among us at the beginning of 1946 has not crystallised, and as we enter into the second year of peace it is impossible to echo Pippa's joyous cry, "all's right with the world."

Grievous problems face us in the international field. The threat of the American coal strike, with its momentous repercussions on the world's food situation, is postponed, not solved; and the worry about what will happen when we have spent the American loan are but items in a long list.

What of the food industry? Despite all unpropitious international, political and economic auguries, the industry is preparing for great things. Its invocation to science and art to an extent undreamt of a decade or so ago is indicated by the installation of huge research laboratories manned by picked men, and "design in industry" is one of the latest shibboleths. These activities do not savour of pessimism, and for our part we gladly join their instigators and forsake those who sadly prognosticate our speedy conversion into radio-active dust. Let us hope that our optimism for the Year of Grace, 1947, will prove to be justified.

The Erosion Menace

Most contemporary studies of the world food situation—at any rate those that are reasonably serious and objective—are based upon estimates over the next two or three years. This is the natural consequence of an immediate crisis when the first essential step must be to struggle out of disaster. Nevertheless, it is rather a comfortable way in which to face grim facts, and it may lead to complacency. Emergency first aid can postpone collapse and stave off pain, but only full-scale medical treatment can restore to proper health. By looking ahead only for two or three years, by dealing predominantly in factual estimates over short periods, official surveys have implied that the crisis is merely temporary, that an age of plenty lies just around the corner. Indeed, so widely is this point of view accepted that British farmers, now asked to produce even more cereal crops, are fearful of a sudden world crisis of over-production that will descend with as much astonishment to experts as did the recent shortage. Now that the 1946 crisis has passed and harvests are filling pipelines, it is time to face the deeper causes and the long-term prospects of the food shortage.

There has been little reference to these deeper causes. Now and again the British people heard the word "drought" in connexion with disappointments from abroad. The word that matters —erosion—has been mysteriously forgotten. The man-in-the-street and the woman-in-the-queue still blindly imagine that across the oceans there are vast countries capable of producing almost all the world's food once things settle down again. The countries are vast enough. What is far too little known is that in very recent history enormous areas of once-rich cropland have been swept into dust-bowls, put out of the farming business for ever by wind, water, and man's economic lunacy. Because our soils receive more water from above than they lose by evaporation, erosion is almost impossible in Britain and, given reasonable husbandry, the top-soil is a stable asset. This good fortune tends to blind us to all that has been happening in America, in Canada, in South America, in Australia, in New Zealand,

A PROSPEROUS NEW YEAR TO ALL READERS

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in Africa, and in India. Without losses by erosion only about 11 per cent. of the global land surface carries enough top-soil to make it agriculturally useful, and much of the 11 per cent. is difficult marginal land; in all, there are some four billion acres for world farming. But thousands upon thousands of these acres have vanished, have been desiccated into deserts, or swept into the oceans by flooding.

Some recent American estimates of the proportions of total productive soils damaged or ruined by erosion were as follows: Africa, between 35 and 60 per cent.; Asia, 40 to 60 per cent.; North America, 50 to 60 per cent.; Australia, 25 to 40 per cent.; South America, 28 to 35 per cent. In real terms, for example, it is known that 50 million acres have been entirely lost in the United States, and another similar acreage seriously damaged. The current demands for more food that fall upon these food exporting countries have to be met by the acreage that is so far unaffected by erosion. But this is in itself a precarious situation, since continuous over-cropping is one of the deadly causes of erosion. Land that is badly in need of rest or rotation is still being intensively farmed. No country should dare to rely upon food surpluses from other countries for any substantial proportion of its minimum needs; advance estimates of such surpluses are paper figures. One severe period of erosion-encouraging weather and a far more serious food crisis than we have so far known will burst upon the world. And all the time, while the world's soil shrinks, its population increases; in the past four decades the increase has been approximately 500 million. Britain may never again be able to indulge in the decadent luxury of neglecting her agriculture or of leaving the nutrition of her people to chance and ignorance.

Irish Bread

The Irish Association of Master Bakers has replied to widespread public complaints by issuing an announcement that bread in Eire has deteriorated considerably in view of the high proportion of the present season's native wheat in bakers' flour, and that bakers have no control over the quality of this, their main ingredient. The statement adds that the high maltose content of the present flour, brought about by the heavy rains in the summer, caused a stickiness in the loaf, which it is impossible to dispel by any known baking process. The Association has been making strong representations designed to secure an improvement in the quality of the flour.

At a recent meeting of master bakers at Kilkenny, under the auspices of the Guild of Irish Bakers, the view was expressed that even if the Minister for Industry and Commerce had to reduce supplies to bakeries, he ought to improve the quality of the flour, as the present flour was responsible for great waste.

Some members of the bakery trade regard the main cause of the poor quality bread as the "infinitesimal" imports of "hard" foreign wheat, and to the fact that Irish wheat, which for many years has been mixed with strong Manitoba grain, now has to stand on its own merits. Six thousand tons of white flour recently arrived from New Orleans and will be distributed to millers to be mixed with local flour, and it is stated that the public will not be able to detect any change in the quality of the bread.

"The significance of this cargo is that it is flour, rather than that it is white," said a prominent miller.

Several thousand tons of Manitoba wheat have also been imported recently.

Meanwhile, an agreement has been reached between the Department of Agriculture and the millers that the latter will make no deduction in respect of moisture content in wheat up to 26 per cent., but will deduct 1s. a barrel for each 1 per cent. or fraction thereof above this level.

Labelling of Food Prosecution

The Dudley Corporation recently summoned, with the consent of the Ministry of Food, a Manchester firm for a breach of the Labelling of Food (No. 2) Order, in that the label on a container of malted soya cream contained a false declaration of the vitamin B_1 content.

Analysis of the preparation showed that it contained only 25 international units of vitamin B_1 per ounce, whereas the label on the tin stated that there were 110 international units. The vitamin content, it was pointed out by the prosecution, should have been given in milligrams and not international units, but this was not regarded so seriously as the deficiency.

The firm pleaded guilty and on their behalf it was stated that when the product was first put on the market three and a half years ago an analysis showed it contained 101·5 international units of the vitamin, and this was subsequently increased by the addition of more malt; the firm

did not realise, however, that the vitamin content of malt varied tremendously. The cost of bringing up the vitamin content from 25 to 110 would be only about a sixth of a penny for a tin costing 2s.

A fine of £15, together with £10 14s. costs, was imposed.

Food Processing in Scotland

The semi-official Scottish Council (Development and Industry) in a comprehensive report on food processing in Scotland, urges the maximum development of all processes known and anticipated to ensure maximum utilisation of Scottish produced food. The Council established a committee on the preservation of food in 1943 with Major G. H. M. Broun Lindsay as chairman. The report shows that Scotland's potentialities lie in canned soups, processed vegetables, and fruit. English markets for high quality processed Scottish food and export markets could also be developed. Glut processing is not regarded as a satisfactory method of operation, and it is insisted that there must be a continuous flow of high quality materials at a steady price to justify the installation of plants and the maintenance of a food processing industry. The main categories of foods involved are fish, milk, meat, eggs, poultry, fruit and vegetables.

The procedure recommended includes quick freezing and low temperature cold storage, both to allow the expansion of the system of retail marketing developed in the U.S.A. and to level out gluts and slumps, thereby maintaining steady commodity price levels. So far only limited work has been done in these directions, due to wartime conditions and the lack of any driving necessity in view of the complete absorption of food in the market. But experimental work has demonstrated that the system of quick freezing is eminently suited to the fishing industry as well as to other industries. Attention is drawn to the experimental work at Torry Research Station, which proved that public demand would absorb readily all the fish which could be held, assuming that an economic price level could be achieved. Demand for frozen herring or kippers has only been limited by the amount offered.

The excellent quality of Scottish beef would give canners or packers an advantage over other parts of Britain were quick freezing used as a retail system for meat cuts as has again been the practice in the U.S.A. The committee considers that this system has definite possibilities and recommends that milk canneries in the South West of Scotland might be used in the off season to can Scottish beef products, while cut meat packing, using quick freeze plants, could handle the retail cut trade.

Milk canning plant could also be used in the winter by the soup manufacturers, who could also utilise Scottish grown vegetables. It is agreed that vegetable production would have to be specially undertaken for this purpose. It is indicated in the report that action has already been taken in certain of the suggested directions and that further investigations are being made. Where recommendations have been made the committee indicates that the Scottish Council will take early and active steps to implement the proposals. One point made is that a nearer source of cans would be advantageous if a major canning industry is to be developed.

Carbon Dioxide Deficiency in Baking Powder

Described by the chairman of the Bench as a "victim of circumstances," a young Cainscross grocer was the defendant in a recent case at Stroud, when he was proceeded against for having sold baking powder which did not comply with the Ministry of Food's Order that its contents should contain at least 8 per cent. of available carbon dioxide. The Bench decided that an offence had been committed, and the defendant was fined £1, and part costs. Prosecuting, Mr. D. G. Rogers, Assistant Solicitor to the Gloucestershire County Council, stated that baking powder should yield not less than 8 per cent. available carbon dioxide, and not more than 5 per cent. of residual carbon dioxide. On May 31, three packets of "Franella" baking powder were bought at defendant's shop, and as a result of an analysis it was found that the sample contained only 4·77 per cent. available carbon dioxide instead of the minimum 8 per cent. prescribed by the Ministry. That, he said, was a matter of prejudice to the public, as it was a 40·4 per cent. deficiency. However, he did wish to say that it was in no way prejudicial to the defendant or to the manufacturer and wholesaler. Before the evidence was called, Mr. J. Lapage Norris, who represented defendant, also addressed the Bench. He said he had received considerable help from the manufacturers and wholesalers in the case, and as a result of his enquiries he was of the opinion that the fault lay with the Ministry of Food by giving permission for the issue of cardboard

cartons instead of metal containers, 2 oz. size, owing to the shortage of metal. On that rested practically his whole defence. Mr. Norris added that the manufacturers of the baking powder had stopped distribution of the 2 oz. size until they could get metal containers. Evidence in support of the prosecution was given by Inspector Thomas, of Stroud, who bought three packets of baking powder from the defendant, and the County Public Analyst, who said the whole value of baking powder depended on the release of carbon dioxide which helped to "raise" a cake. The amount of carbon dioxide present in baking powder was most essential, and with such a deficiency of 40 per cent. a cake would only rise slightly. That would result in a serious waste of food materials. Cardboard containers were not as satisfactory as metal containers, and shopkeepers should take that into consideration when storing. One baking powder manufacturer, called as a witness, said his firm produced about 4 per cent. extra of available carbon dioxide as required by the Ministry's Order. The same firm's managing director said the Ministry would not permit the use of metal containers for 2 oz. size of baking powder products, metal containers only being permitted for sizes of 4 oz. and more. They had difficulty with the cardboard cartons and did what they could to withdraw them from circulation, and attempted to locate what samples there were by instructing their travellers to take them in. The Bench, in announcing their decision (as mentioned previously), said they considered that the defendant had acted in a normal way and was not personally responsible. However, the powder had been at his disposal for a very long time and had deteriorated—so an offence had been committed.

Tideless Thames

Many users of transport on the Thames were disappointed that the Minister of Town and Country Planning, answering a question from Sir Waldron Smithers in the House of Commons, refused to hold an enquiry at present on the merits of a barrage to render the river tideless. Mr. W. H. Gaunt, M.Inst.T., a director of J. Lyons and Co., Ltd., and a committee member of the Thames Barrage Association, says that a tideless Thames, quite apart from its desirability on health and aesthetic grounds, would solve many of his problems.

"The trend today is away from casual hours," he said, "yet, owing to difficulties of unloading at the firm's wharf at Hammersmith during low tide, regular work is impeded." Modern methods of unloading, such as use of conveyors, were impossible, he pointed out, unless ships were at a constant level.

Mr. Gaunt looks forward to the time when the smaller ocean-going ships will be able to bring their cargoes within easy reach of Cadby Hall. Such a development would, he recognises, involve raising the level of some bridges. But it would have the advantage that ships which now unload at the docks would come right to the company's wharf. They would not be subjected to the strain of settling on sloping and often uneven banks at low tide. Moreover, besides the economy for the firm, the public would benefit by the removal from London's congested streets of a large number of lorries carrying food from the docks.

Hilarity in Parliament

For some reason Mr. Strachey's recent announcement in the House of Commons of the "Food Leader Scheme" occasioned almost general hilarity. He said that "this scheme was to provide a voluntary link between the ordinary housewife and the cookery and nutrition experts of the Ministry," this statement causing the initial burst of laughter. It appears that there are to be 23,000 food leaders employed in a voluntary capacity, the only expenditure incurred being for such items as hiring of halls, the provision of display material, food leader badges, and printing.

Mr. Gammans asked what these people were supposed to do. Another laugh swept through the house when Mr. Strachey said that they were supposed to give nutritional leadership. This mirth puzzled the Minister and his subsequent explanation was punctuated by "renewed laughter." He said that the above-mentioned number of "very earnest and very public spirited women" were to explain the relief food and welfare food schemes to the people. Mr. Gammans returned to the fray and asked what was meant by nutritional leadership and it transpired that this was tantamount to explaining the nutritional value of foodstuffs.

We are not particularly amused, but are a little surprised to gather that there are 23,000 women competent to put over nutritional science to the general public.

Herring curing yards at Great Yarmouth.

The HERRING FISHING INDUSTRY

This article discusses the work of the Herring Industry Board, the problems faced, and their plans for the future development of the industry.

THE herring fishing industry has played an important part during and since the end of the war, in providing valuable and nutritious food for Britishers and those abroad who still rely on Great Britain for foodstuffs.

Withdrawal of restriction and the return of boats and men to commercial fishing have resulted in a relatively pre-war situation, limited by the fact that the existing food scarcity encourages a greater consumption of fish than might be expected in a period when all other foods were in bulk and at low prices. That this situation may again materialise is the fear of most producers who see a market glutted by overproduction, falling prices, and consequent unemployment. The fishing industry has been traditionally afflicted by such a situation, and has been specially vulnerable to the consequences and reactions of periodic boom and slump. It is admitted by all concerned that the industry is ultimately one in which the element of chance is a major factor. The passages and density of shoals

and the accuracy of judgment which permits the gathering of these shoals are not subject to any method of accurate scientific control yet known. To some extent, tradition and lore supply data on which the industry may operate; yet there is a growing belief that this industry, like all modern industries, is capable of some degree of scientific control, despite the unpredictable nature of the product with which it is concerned.

Elimination of Booms and Slumps

The Herring Industry Board, which was constituted by the Government to consider and act on the premise that the industry could and should make the fullest use of all methods calculated to predict the unpredictable, has made very considerable progress. It would have been correct in the past to say that there was little prospect of eliminating booms and slumps. The Board's present policy is to encourage full production and full usage. The Board believe that both these objects can be attained. If they are attained, the booms and slumps which have in the past been experienced within the short compass of a single season can be eliminated.

The Main Problems

The worst of the problems now facing the Board might be described as follows:

A decline in Continental consumption, due to (1) the development of economic nationalism; (2) the absence of purchasing power which prevented those who wanted to buy and consume cured herring from doing so.

Irregularity of landings which resulted in boom and slump conditions alternatively, and in artificial attempts to maintain prices by reduction of production.

Lack of unity in an industry composed of many small units, in different areas and with different interests, linked only in that they worked with a common commodity—the herring.

The decline of recruitment, the collapse of many small communities, the lack of fresh capital, the lack of centralised scientific research, and the general disinclination to regard herring fishing as a remunerative employment.

Composition of Board

The Herring Industry Board has statutory authority based on Acts of 1935, 1938, and 1944. It is controlled by three members nominated by the Secretary of State, the Ministry of Agriculture and Fisheries, and the Home Office. Its permanent headquarters are in Edinburgh, from which it has increasingly extended its work throughout Great Britain, from the far Shetlands to the South of England. Present members are Mr. F. A. Bell, O.B.E., M.C., chairman, chairman of a prominent laundry group, Major General Sir Evan Gibb, K.B.E., C.B., C.M.G., D.S.O., a past President of the London Chamber of Commerce, and Sir George Wilson, chairman of the Scottish Milk Marketing Board. It will be noted that none of the members is himself engaged in the industry, thus ensuring that disinterested interest which the Government normally seeks in a body of this nature.

Secretary of the Board is Mr. T. H. Wilson, and the Board's Chief Executive Officer is Mr. Hugh Goodwin, a Fellow of the Institute of Chartered Accountants, whose knowledge of supply and transport problems was greatly augmented by his war-time experience of these matters.

A Far-Reaching Programme

With the end of the war, the Board has initiated a far-reaching programme of practical development. It is perhaps fortunate for its plans that the industry is at present in a period of intense demand and in a mood to consider any proposals aimed at softening the blow which the average herring fisherman believes to be imminent.

This is vital to any successful completion of the plans which have been framed, since the Board cannot possibly achieve any positive results unless through the full co-operation of the industry. It is true that the Board has powers of compulsion, but use of these would be admission that other methods were unequal to the need; so far diplomacy has successfully avoided any need to use compulsion.

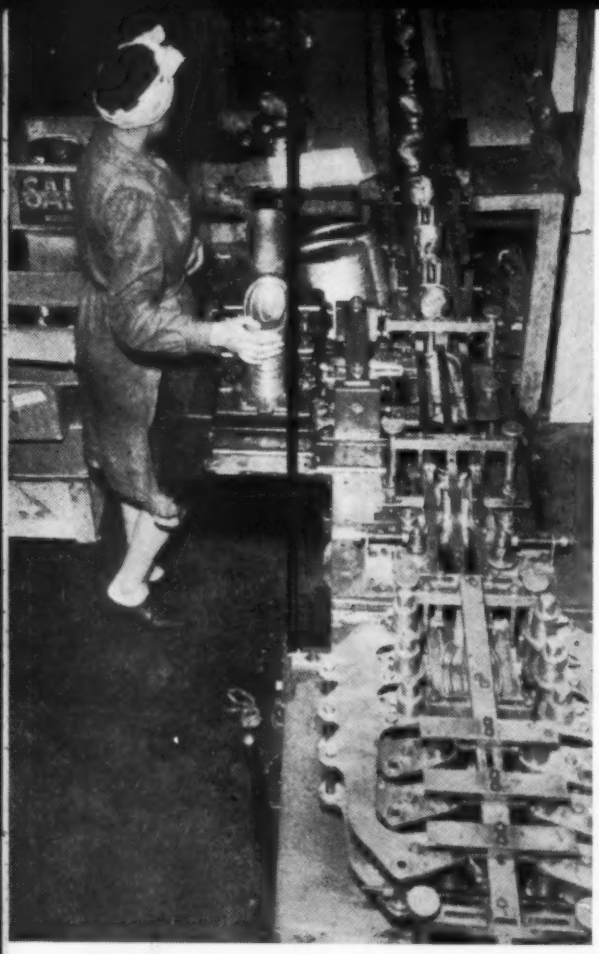
The Board operates on a basic belief that the industry can be as prosperous as its total gross earnings will permit; that to limit production in an attempt to sell a smaller volume at a larger price is basically wrong; rather that every effort should be made to catch the maximum volume of herring, consistent with all the available outlets, and to sell these at the highest prices available in each classification and to each type of user, thus increasing the total gross earnings of the industry. In the past, this policy has been defeated by the limited number of outlets and the retarded use of the herring in the Continental and Slav countries as a main item of food.

Outlets and Catching Capacity

The immediate duty of the Board, since its inception, has been therefore to increase the possible outlets for herring, and to use every development of science to achieve this end. Coincidental with this, the Board has initiated a series of experiments aimed at increasing the catching capacity of the industry, thus keeping pace with any capacity to achieve additional disposals.

Weighing and packing herring into tins in a canning factory.

Packing herring in waxed paper prior to freezing.



Double seaming the tins.

Obviously, such a co-ordinated programme must involve periodic maladjustments; perhaps these will never be entirely eliminated. On the whole, however, the progress has been real and substantial, largely as a result of mediation and co-ordination by the Board, while it might be fair to claim that never at any time has the industry been so united, while still, on occasion, disagreeing or agreeing to differ.

The development of outlets for herring has been a long and continuous process. Many individuals and groups have co-operated to achieve these results.

Quick Freezing

The Board established experimental quick freezing units in the main herring fishing areas in 1944-1945 and froze a substantial volume of fish by this method, and the next year a similar and larger freeze was undertaken. Herring were supplied in prime condition some four months later to South of England fish traders, who expressed delight at the out-of-season arrivals and their excellent condition.

By-Products

The Board has been closely interested in herring meal and herring oil for some years, and visualises a considerable market for both products when maximum production can be organised to synchronise with guaranteed delivery of tonnage at a guaranteed price to the processing plants. The meal and oil processing industry is of importance as it forms an outlet for herring not necessarily completely fresh. It is the one known process by which herrings can be stored without preservation for a matter of days and still produce a first-class article, or for some weeks and produce very nearly a first-class article. The processing machinery demands a measure of regularity of throughput, but this regularity does not necessarily have to be assured by means of a regular daily supply.

Storage pits are used to absorb large quantities of herring, on days of heavy landings, which can be processed subsequently. The storage pits are a buffer stock to ensure regularity of intake to the plant.

The Board has refused to give definite details as to its intentions in these spheres, but there has been the present indication from the Ministry of Food that herring oil extraction will be subsidised to permit the oil being made available in the present food shortage. The Board is involved in these discussions, and has indicated its intention of developing these by-products to the maximum possible level.

Herring Canning

Every effort is being made to increase the amount of herring for use either in Britain or abroad, and new plants have been established to this end. There are also experiments in progress at the present time to use metal containers in place of wooden barrels, and to discover the keeping qualities of herring packed under varying conditions. These plans all link up with the determination to see the herring again a standard item of British diet, by the use of the most efficient and economic methods of processing.

Co-ordinated Marketing

One important instance of co-ordinated marketing might be cited. The herring fishermen of Shetland, facing modern conditions without the cohesion necessary for their mastery, were invited

by the Board to co-operate in a marketing programme. The Board was to be appointed sole marketing company for all Shetland herring, and promised in return to establish in Shetland one or more combined processing unit, consisting of a quick freezing plant, kippering plant, and sharp freezing plant for kippers, cold storage, and herring oil and meal reduction plant. A cannery has not yet been established, although it forms part of the Board's plans for the complete development of the industry in Shetland. Curing is carried on, not by the Board, but by individuals at their several curing stations.

All this has been done and the first cargo of quick frozen and processed herring sent to the London market in a refrigerated steamer.

Plans for Other Areas

This is the prototype organisation which the Board plans to establish in other British areas, thus ensuring that the maximum possible catch will be processed by whichever method offers the fullest and most ready outlet in terms of public demand and industry income. On the catching side, the Board has been equally progressive. Most important development is undoubtedly the construction of two modern Diesel engine trawlers, on new lines, and with modernised gear. These are 65 ft. long, 18 ft. beam Diesel type ships with low running costs and positive manoeuvrability. When these vessels—now building in Scotland—go into commission, the Board will have an opportunity to assess the wisdom of its designing. Recent powers were given the Board to build, hire, or otherwise operate vessels, and in view of the extended power given, the present building programme is significant.

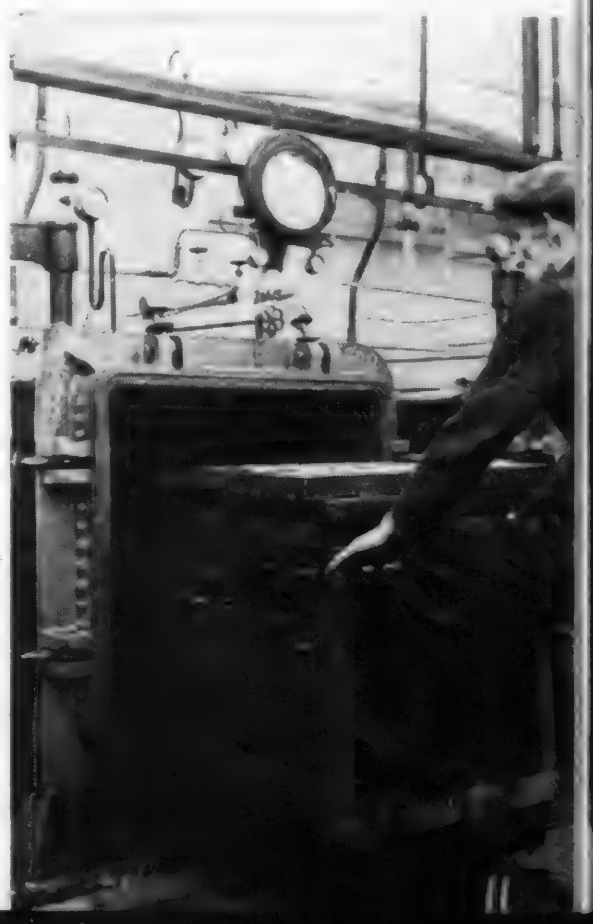
Naval Co-operation

The Board also initiated naval co-operation in the location of fish shoals by the Asdic method of detection. This has proved a positive success in locating shoals, and predicting the extent of the shoal with considerable accuracy. Air scouting and other experimental methods have been fully investigated, while the Board is deeply interested in the mechanics of fish catching and handling, on the theory that no old industry, and especially one using traditional methods, is so perfect as to defy investigation in the light of recent technical, scientific, industrial, and commercial developments, to say nothing of the utilisation in actual catching of newer types of mechanism which have been devised in recent years. It may be that modern adaptations of traditional methods may still prove superior to entirely new devices, but the essential point is that some such survey of practices and equipment is due and is being given the necessary attention.

Efficiency in the Industry

There are many other efforts being presently made on the technical side to make the producer of herring as efficient as the nature of his calling will permit.

With faster, modern, efficient, economically operated trawlers, aided by recognition and detection services and devices, the fleets should be enabled to fish a shorter time for a larger catch of fish, all other factors remaining stable, or a similar length of time for a much larger catch of fish. The element of chance cannot be ignored here, but research has already demonstrated that chance can be controlled to some degree. These larger catches should mean, in due course, larger gross earnings, assuming that the various processing services are perfected, as they will be, to the point of handling all but the more exceptional gluts, which will never be eliminated. Which proposition reaches the heart of the problem—that the British and the Continental citizen be encouraged to eat herring to such a volume as to clear those gross earnings.



Tins entering the automatically controlled retort.

Markets for Herring

A great and important market is at present cut off by Russian dominance; that market may return. But fundamentally, the essential market for herring is in Britain, if Britishers will give the industry the desired support. Over the war years, herring have been welcomed by thousands, in various processed types, who never previously ate herring. Whether that consumption continues and expands is the vital factor on which all these plans depend. In due course, publicity will be used to "sell" the processed types, if and when the market interest flags. To date, production is being cleared, but under very favourable conditions. What is desired is clearance of a vastly greater bulk under less favourable conditions, and only time holds the clue to success.

Since this article was written, the Herring Industry Board has issued a report on the reorganisation of the industry (Cmd. 6957. H.M.S.O. Price 6d.). The plans provide for the production of 3,000,000 crans a year by 1951, double the quantity landed in 1938.

The fishing will be done by a fleet of 1,000 vessels, apart from smaller vessels which can more conveniently carry out certain specialised and localised fishings. The number of fishermen employable will be about 12,000.

The Report covers many aspects of the industry such as transport, quick freezing, kippers, packing, oil, and factories.

Important developments in low temperature rail and road transport are expected.

The possibility of keeping large quick frozen stocks of summer and autumn caught herring for release in months of scarcity has been examined. It is estimated that quick freezing plants and improved transport facilities could double home consumption to 450,000 crans per year.

The demand fostered by the war would, it is considered, increase the disposal of kippers, bloaters, and red herrings to the extent of an additional 450,000 crans. The Report suggests that, together with quick frozen herrings, an export target of 150,000 crans should be reached, and exports of canned and marinated herrings should reach a target figure of 100,000 crans.

Owing to the rising costs of barrel production, research into the possibilities of using alternative packaging for cured herrings is considered advisable.

Methods are being examined to render the extraction of edible oil more efficient and less costly. The residual material has a high protein content suitable for cattle feeding.

The suggested erection of oil and meal factories is not directed towards absorbing "gluts," but as normal outlets for the large and active fleet.

CORRESPONDENCE

Road Transport Nationalisation and the Trading Community

TO THE EDITOR OF FOOD MANUFACTURE

DEAR SIR,—After long delay we now have a clear official intimation as to the effect on the trading community of the Government's proposals to nationalise road transport. Frequent references have been made to the nationalisation of "long-distance" road transport, the implication being that there would still remain free from nationalisation a very considerable number of short-distance hauliers and the trader running his own vehicles for the carriage of his own goods.

Now, Mr. G. R. Strauss, the Parliamentary Secretary to the Ministry of Transport, has made certain very important statements. He has referred to the joint proposals of the Main Line Railways and the Road Haulage Association, arriving at the conclusion that those who drew them up could not be blamed for having failed to do the impossible. He then went on to ask the rhetorical question, "Is the principle of correlation intrinsically the best method of establishing a national rates structure?" This he followed by the statement that, "It is surely by now proven beyond any doubt that no workable solution of this urgent problem of conflicting rates is possible except by establishing between the conflicting parties a community of financial interest under a common ownership."

The parties in question are road and rail transport. By far the greater number of vehicles carrying goods upon the roads are run by traders holding C licences. "Community of financial interest under common ownership" could not be achieved so long as these traders continue to carry their own goods in their own vehicles when and where they please. Under a system providing a community of financial interest under a *common* ownership it would be impossible to allow *any* trader to run *his own* vehicles. It is therefore clear at last that the Government's policy favours the *complete* nationalisation of *every commercial vehicle* upon the road, and that any statement that falls short of indicating this ideal is merely devised to soothe the public into a false sense of security until it is too late for the trading community to protest effectively against the entire removal of its freedom of choice as to the method of transport that it will employ.

Yours faithfully,

HORACE WYATT,
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London.

The Estimation of Thermophile Spores in Canning Ingredients

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THE techniques in general use for the enumeration of flat-sour spores in sugar and starch intended for canning purposes are those described by Cameron (1936) and Clark and Tanner (1937). Cameron's method consists of making a 20 per cent. solution of sugar from each of five samples and boiling the solutions for 5 minutes before 5 × 2 ml. amounts from each sample are pipetted into petri-dishes and covered with dextrose-tryptone agar. After 36 to 48 hours' incubation at 55° C. the typical acid-producing colonies are counted. For the five samples examined there should be a maximum of 75 spores and an average of not more than 50 spores per 10 g.

Clark and Tanner (1937), in describing a modified technique for starch, state that a longer heat-treatment is necessary, and recommend heating 100 ml. of melted dextrose-tryptone agar containing 20 ml. of a 10 per cent. suspension of starch for 30 minutes at 212° F. (100° C.) before pouring the mixture into six petri-dishes and incubating in the usual way. The standards are the same as for sugar.

Weakness of Existing Standards

These methods and standards for flat-sour spores have secured wide acceptance. Great reductions in the spore counts of sugars and starches for canning purposes have undoubtedly been made through the institution of these standards, particularly in America, but in our view they have serious weaknesses when used in assessing the quality of canning materials because they do not take into account either the heat-resistance of the flat-sour organisms counted or of the varying amounts of different raw materials used. Moreover, the method is usually complicated, particularly in the case of flour, by the growth of vigorous spreading and ammonia-producing bacilli which either obscure flat-sour colonies or inhibit their growth altogether. In our experience, and we believe it to be not uncommon, these spreaders are not wholly prevented from swarming by layering the plates with 2 per cent. agar, as suggested by Cameron (1936), even when the dextrose-tryptone agar plates are carefully dried both before and after layering them with the agar solution.

Williams (1936), Cameron and Williams (1928), and Clark and Tanner (1937) do not appear to have examined the flat-sour counts of materials heated at temperatures other than 212° F.

Williams stated that heating sugar solutions for 3, 5, 10, 20, or 30 minutes at 212° F. made no significant difference to the spore count; he selected 5 minutes at 212° F. as a suitable preliminary eliminative treatment but gave no reason for the choice.

Clark and Tanner recommended that starch suspensions should be heated for 30 minutes at 212° F. because the flat-sour count obtained after heating for 5 minutes at 212° F. was high, although spoilage in canned corn did not occur when starch so tested was used.

Destruction of Non-Spoilage Types

Cameron and Williams stated that heating solutions of sugar for 5 minutes at 212° F. was insufficient to destroy "non-spoilage" types, *i.e.* organisms which do not produce the typical flat-sour colony described by Williams (1936). Surface colonies of these are 2 to 5 mm. in diameter and have an opaque central spot, the sub-surface colonies being small and compact. The authors also stated that the "non-spoilage" types, representing growth by common soil thermophiles, varied greatly in numbers but that there was no correlation between their numbers and those of the flat-sours. These workers showed that of seventy-seven colonies examined from plate-cultures of sugar made after heating for 5 minutes at 212° F., sixteen were obligate thermophiles, and heat resistance tests on twenty-seven cultures showed that more than half were killed in 30 minutes at 230° F. (110° C.). They concluded with the following statement: "It is impossible to state with certainty the minimum degree of resistance to heat which must be inherent in a flat-sour to hold significance in the canning industry, but conservatively it is felt that those bacteria the spores of which exhibit a heat-resistance greater than 50 minutes at 230° F. would, depending on their concentration, constitute a spoilage hazard."

It is clear that if flat-sour spores constitute a spoilage hazard only when their heat-resistance exceeds 50 minutes at 230° F., then the preliminary heating normally given to both sugar and

starches (5 and 30 minutes at 212° F. respectively) is inadequate, since it allows not only non-spoilage types to survive but also any flat-sour spores whose heat-resistance is less than 50 minutes at 230° F. but much more than 5 minutes at 212° F. From this it follows that, using the American procedure, flat-sour counts might be quite high without there being any organism present whose spores could survive normal processing conditions and, in consequence, a raw material might quite unnecessarily be classed as unsuitable for use in canning. Conversely, a raw material with a relatively low flat-sour count might cause considerable spoilage if the average heat-resistance of the spores were high. If, however, a count were to be made after heat-treatment sufficient to destroy all spores with a heat-resistance less than that required to survive the normal processing of canned foods, then any spores surviving such treatment could be regarded as potential spoilage types. We, therefore, consider that a clear distinction should be drawn between flat-sour spores in general and flat-sour spores which survive a heat treatment approaching that used in processing canned foods. We refer to this second class as potentially process-resistant (P.P.R.) spores.

Emphasis on Heat-Resistance

It is felt that quite as much emphasis should be placed upon the heat-resistance of flat-sour spores as upon their numbers, since a knowledge of both factors is required in order to give a satisfactory opinion on a raw material. In our experience the heat resistance of the spores in a raw material determines the occurrence of spoilage, while their numbers determine its extent. The importance which attaches to heat-resistance of flat-sour spores in a raw material is not in our view given sufficient consideration in the standard procedures.

EFFECT OF INCREASED HEATING

Believing that the eliminative heat-treatment of the raw material solutions and suspensions at present in use is inadequate, we have carried out a number of tests on various raw materials to determine the effect of increased heating periods. The results of some representative experiments are given below.

Sugar

Method.—20 g. of sugar were weighed out, dissolved, and made up to 100 ml. with sterile water. 25 ml. of this solution were placed in four sterile bottles; one was boiled for 5 minutes, the remainder autoclaved at 230° F. for 15, 30, and 45 minutes respectively. Five plates, using dextrose-tryptone agar, were then poured from each bottle.

1.

Spores per 10 g.	5 *Mins.* at 212° F.	15 *Mins.* at 230° F.	30 *Mins.* at 230° F.	45 *Mins.* at 230° F.
Total	155[1]	265[2]	100	95
Flat-sour ..	95	125	85	95
"Non-spoilage"	60	140	15	0

[1] One plate overgrown with an ammonia-producer, two plates completely yellow with spreading acid-producers.
[2] One acid-producing spreader covered part of one plate.

NOTE.—"Non-spoilage" types were calculated by subtracting the flat-sour count from the total count (Cameron and Williams, 1928).

In this experiment the count was actually greater after heating for 15 minutes at 230° F., due to the masking of colonies by spreaders on the cultures made after heating for 5 minutes at 212° F. After 30 minutes at 230° F. the number of "non-spoilage" colonies was greatly reduced. There was also a fall in the flat-sour count.

2.

Spores per 10 g.	5 *Mins.* at 212° F.	15 *Mins.* at 230° F.	30 *Mins.* at 230° F.	45 *Mins.* at 230° F.
Total	340[1]	100	65	20
Flat-sour ..	0	0	0	0
"Non-spoilage"	340	100	65	20

[1] Some surface spreaders.

The "non-spoilage" colonies surviving 30 minutes at 230° F. were all acid-producers without an opaque spot.

Meat Extract

Method.—10 g. of meat extract were dissolved in water and made up to a volume of 100 ml. 25 ml. portions were placed in four sterile bottles. One was heated for 30 minutes at 212° F., the remainder being autoclaved for 15, 30, and 45 minutes at 230° F. Portions were then pipetted for plating in dextrose-tryptone agar.

1.

Spores per 10 g.	30 *Mins.* at 212° F.	15 *Mins.* at 230° F.	30 *Mins.* at 230° F.	45 *Mins.* at 230° F.
Total	70,000	35,000	290	10
Flat-sour ..	70,000	35,000	290	10
"Non-spoilage"	0	0	0	0

2.

Spores per 10 g.	30 *Minutes* at 212° F.	30 *Minutes* at 230° F.	45 *Minutes* at 230° F.
Total	90,000	2,830	2,330
Flat-sour	89,800	2,070	2,190
"Non-spoilage" ..	200	160	140

3.

Spores per 10 g.	30 *Minutes* at 212° F.	30 *Minutes* at 230° F.	45 *Minutes* at 230° F.
Total	38,900	40	0
Flat-sour	38,000	40	0
"Non-spoilage" ..	900	0	0

In spite of the enormous flat-sour count obtained after heating for 30 minutes at 212° F. only 10 spores survived 45 minutes at 230° F. in sample 1 and none at all in sample 3, but over 2,000 in sample 2.

Flour

Method.—10 g. were suspended in sufficient sterile water to make up the volume to 100 ml. After thorough shaking, 20 ml. quantities were added to 100 ml. bottles of dextrose-tryptone agar melted and cooled to 60° C. One was heated for 30 minutes at 212° F., the others were autoclaved at 230° F. for 15, 30, and 45 minutes respectively. Six plates were then poured from each bottle.

1.

Spores per 10 g.	30 *Mins.* at 212° F.	15 *Mins.* at 230° F.	30 *Mins.* at 230° F.	45 *Mins.* at 230° F.
Total	25[1]	20[1]	50[2]	15[2]
Flat-sour ..	15	20	50	15
"Non-spoilage"	10	0	0	0

[1] All plates covered with "spreaders."
[2] Two plates covered with "spreaders."

NOTE.—Some spreaders survived 45 minutes at 230° F., an occurrence which has been found most frequent in the case of flour. Nevertheless, more flat-sour colonies were visible after heating for 30 minutes at 230° F. due to the reduction of the area masked by spreaders.

2.

Spores per 10 g.	30 *Mins.* at 212° F.	15 *Mins.* at 230° F.	30 *Mins.* at 230° F.	45 *Mins.* at 230° F.
Total	340[1]	100	65	20
Flat-sour ..	0	0	0	0
"Non-spoilage"	340	100	65	20

[1] Surface spreaders obscured some colonies.

The "non-spoilage" organisms surviving 30 minutes at 230° F. in this experiment were acid-producing colonies of the actinomyces type without an opaque central spot.

Marmite

The method used was the same as for meat extract.

Spores per 10 g.	30 *Mins.* at 212° F.	15 *Mins.* at 230° F.	30 *Mins.* at 230° F.	45 *Mins.* at 230° F.
Total	165	0	0	0
Flat-sour ..	85	0	0	0
"Non-spoilage"	80	0	0	0

It will be noticed that none of the flat-sour types in this sample survived 15 minutes at 230° F.

Spices

Method.—2 g. of spice were weighed out and shaken up with sufficient sterile water to make up the volume to 100 ml., the liquor was then distributed in sterile bottles and heated for the periods stated; 5 × 2 ml. amounts were pipetted out into petri-dishes from each bottle and poured with dextrose-tryptone agar in the usual way.

MIXTURE A.

Spores per 10 g.	30 *Minutes* at 212° F.	30 *Minutes* at 230° F.
Total	600	350
Flat-sour	600	350
"Non-spoilage" ..	0	0

MIXTURE B.

Spores per 10 g.	30 *Minutes* at 212° F.	30 *Minutes* at 230° F.
Total	7,850	1,350
Flat-sour	3,850	1,350
"Non-spoilage" ..	0	0

Samples of onion powder, paprika pepper, and potato powder have also been cultured; but flat-sour spores were either absent, or present to the extent of only 10 or 20 spores per 10 g.

The effects of increased heating are summarised below:

1. The flat-sour count is reduced after 15 minutes at 230° F. and is further reduced after 30 minutes and 45 minutes heating at this temperature unless masking of the plates by spreaders has been extensive in the sample heated for 30 minutes at 212° F. No difference is noticed in the appearance of the flat-sour colonies surviving 30 minutes at 212° F. and those surviving higher temperatures.

2. The number of flat-sour spores surviving 30 minutes at 212° F. gives no indication of the numbers likely to survive at higher temperatures.

3. After heating raw materials for 30 minutes at 230° F. surface-spreading types are practically eliminated and seldom interfere with the enumeration of colonies, but they occasionally occur in materials such as flour even after heating for 45 minutes at 230° F. This may be due to the fact that whereas starchy substances are heated in tryptone agar, producing a nearly neutral mixture, other materials are heated in aqueous solutions which are more acid; thus 10 per cent. solutions of marmite and meat extract have *p*H values of about 5·4 and 6·0 respectively. Such variations in heating conditions may affect the survival of all spores present, a point to which further reference will be made later.

4. There is a reduction in the number of other "non-spoilage" types, i.e. various actinomyces and aerobic spore-formers.

The reduced flat-sour count obtained by heating at 230° F. could be due to destruction of spores or to dormancy induced by sub-lethal injury. We have found, however, that when significantly heat-resistant spores are heated in raw materials for 45 minutes at 230° F. there is no appreciable delay in the appearance on the plates of visible colonies. We believe, therefore, that the effect of increasing the heating time and temperature is merely to eliminate spores whose heat-resistance is so low that they have no significance in the spoilage of normally processed canned foods.

It is our contention that as a routine measure the

eliminative heat-treatment for raw material samples should be increased in order to obtain a count which gives a more accurate idea of the numbers of P.P.R. spores present and we have tentatively adopted a heating period of 30 minutes at 230° F.

It may be objected that by such treatment the general hygienic picture of the sample would be lost, but as stated by Cameron and Williams (1928) and indicated by our own experiments, there is no correlation between the numbers of " non-spoilage " types and the flat-sour count with which the canning bacteriologist is more concerned.

It can also be argued that the flat-sour count obtained after heating for 30 minutes at 230° F. does not give an exact index of the numbers that will survive processing in canned foods; it is fully realised that this is so, but in practice several factors, such as the *p*H at which raw materials are heated, vary according to the nature of the sample, and may differ again from the conditions obtained in the finished product in which the spores will be processed. Accordingly, allowing for these varying conditions, 30 minutes at 230° F. does seem sufficient to eliminate spores with no chance of surviving any commercial process for a non-acid pack, without risking the destruction of spores of borderline heat-resistance which might resist processing in certain packs where conditions are favourable for survival.

REVISION OF STANDARDS

With regard to the standards of the American methods, the influence of the varying amounts of raw materials used on the bacterial load in the can calls for consideration. Assume, for example, that samples of sugar and flour, having been tested by the American techniques, are both found to contain 40 spores per 10 g. and are, therefore, acceptable since they conform to the standards. In a certain recipe for soup, sugar constitutes 0·5 per cent. and flour 7·5 per cent. of the out-turn. It is a matter of simple arithmetic to show that every 1 lb. can of soup made from those raw materials will receive an average of 9 flat-sour spores from the sugar and 136 flat-sour spores from the flour. If 40 flat-sour spores per 10 g. are permissible in the sugar, is not that number too large for the flour? It could be argued that if the flour contained only, say, 4 flat-sour spores per 10 g., a much higher spore-count could be tolerated in the sugar. Actually very little is known of the number of spores in a can which is required to initiate growth and souring. In Cameron and Yesair's (1931) experiment on the effect of bacterial load, pea *purées* containing (1) no sugar, (2) sugar A (60 flat-sours per 10 g.) and sugar B (2,500 flat-sours per 10 g.), were processed at 250° F. (121° C.) for 70 minutes; it was found that only the *purée* containing sugar B showed spoilage. It can be inferred from this that as the heat-destruction of spores follows a logarithmic course, the smaller number of spores introduced by sugar A were destroyed, but not the large number of spores introduced by sugar B. Their results, however, might be equally well explained by assuming that only a very small percentage of the flat-sour spores enumerated by the technique used had a heat-resistance approaching that required to survive normal processing conditions.

In our view, the standards for flat-sour spores, and indeed for any type of spoilage organism, should not be based on the numbers of spores in a given quantity of raw material but on the number which the material will convey to each can. In other words, raw materials should be assessed on the basis of the quantity to be incorporated in the canned product. If this is accepted, it is clear that a material classed as unsuitable when used in high concentration in one pack may be passable for another pack where the amount used is low.

Minimising Spoilage in Export Packs

As a practical means of minimising spoilage in export packs we have tentatively adopted the method of testing raw material consignments after heating their suspensions or solutions for 30 minutes at 230° F. before estimating the P.P.R. flat-sour spore contents. In the selection of materials, counts are considered in relation to the concentrations in which the materials are to be used. By this method it is possible to estimate the probable total spore content per can, and our experience is that when this is of the order of 10 or less, thermophilic spoilage is negligible. We have noted, however, that occasional cans undergo souring even when very few spores are present. This aspect of the relation of bacterial load to spoilage requires further investigation before satisfactory standards for canning ingredients can be adequately defined. In the control of thermophilic spoilage, it is of course essential to give due attention to each ingredient of the pack; certain brands of meat extract, for example, have been found to be very heavily contaminated with heat-resistant flat-sour spores and may contribute more spores to a pack than all other raw materials combined.

With reference to the American methods and standards for thermophilic anaerobes, it is believed that many of the foregoing remarks concerning flat-sour spores can be equally well applied. Here also the number of spores per can is of first importance in determining the extent of spoilage, and the anaerobic spore content of raw materials should be considered in relation to the quantities used in a given pack. Thermophilic anaerobe spores are

generally more heat-resistant than the flat-sour types and relatively few are required to produce an appreciable amount of spoilage.

In conclusion, the main object of this preliminary article is to draw attention to what is believed to be some deficiencies in the standard procedures for the estimation of flat-sour spoilage organisms in canning ingredients. In the home market, because of the temperate climate, thermophilic spoilage of canned goods has not excited great interest, but experience with service packs during the war years has clearly shown the importance of thermophilic contamination in the export market.

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Food Analysis

THERE is an increasing tendency, nowadays, to relate the practical work of a student, illustrating the application of fundamental procedures of chemistry, to actual examples drawn from that branch of the profession in which he desires to pursue his career. In this way solubility products, isoelectric points, *p*H values, etc., cease to be something to be "crammed," because the examiner might ask awkward questions about them, but become powerful weapons by which the well-trained man can overcome difficulties in the laboratory, or the factory, and which he can apply to new problems without time- and energy-consuming groping for a "lead."

Professor A. G. Woodman's book,* now in its fourth edition, was written with the idea of illustrating important methods of attack or characteristic methods of food analysis as applied to typical foods. His object has been to show the suitability and the limitations of various methods in practice and to assist the student to develop his sense of discrimination and judgment. This is most important, since natural products are capable of wide variations in composition and the food analyst is often called upon to exercise his critical faculties on analytical data to decide whether or not the product has been artificially manipulated for some reason or other. The book admirably fulfils its primary purpose and students of food analysis will find much of value throughout its pages. To those already engaged in the profession it offers mental stimulus.

No attempt has been made to include a great variety of foods and those dealt with are not necessarily the ones with the greatest economic importance. Special attention, however, is given to fats and oils, carbohydrate foods and alcoholic beverages, general methods applicable to the whole of a group being discussed first, followed by a more detailed examination of several typical examples. The detection and identification of dyes used or likely to be used in colouring foods are discussed at some length in view of the difficulty of finding adequate discussion of the subject elsewhere and the difficult nature of the matter. It is good to find that, besides giving the manufacturer's name for the dyestuffs, the Colour Index numbers are also given. This makes the scheme useful to workers in countries other than America, since the dyestuffs for which workers in these countries will be looking will probably be of national origin with entirely different names but practically identical composition.

Chapter I deals with General Methods, such as determinations of specific gravity, refractive index, moisture, and colorimetric determinations, to mention a few. The microscopical examination of foods is dealt with adequately in Chapter II. The next chapter deals with Food Colours and Preservatives; Chapter IV with Milk, Cream, and Ice Cream; Chapter V with Edible Oils and Fats; Chapter VI with Carbohydrate Foods such as sugars, maple syrup, and honey; Chapter VII with cocoa and chocolate; Chapter VIII with Condiments and Spices; Chapter IX with Cider Vinegar; Chapter X with the Flavouring Extracts, vanilla, lemon, and ginger; and, finally, Chapter XI with Alcoholic Foods such as Wines and Whisky. A section containing some 47 good photomicrographs constitutes a useful addition to the text and the book is rounded off with a good index.—J. A. R.

* *Food Analysis: Typical Methods and the Interpretation of Results.* By A. G. Woodman. Pp. 607. New York and London. 22s. 6d. net.

Bacteriology of Frozen Foods

THE need for standardised methods in the bacteriological examination of frozen foods was emphasised at the annual meeting of the Society of American Bacteriologists by J. A. Berry, of the U.S. Department of Agriculture. Factors of importance, he said, are method of sampling, preparation of sample, medium, time, and temperature of incubation. Tests for specific bacteria, such as *Escherichia coli*, were said to be of doubtful value, since this organism, like others, dies during frozen storage. A direct microscopic test was recommended as a better gauge of sanitary history than the culture method.

The Milling Industry

Progress in 1946

A. J. AMOS, Ph.D., B.Sc., F.R.I.C.

Although more than a year has elapsed since the termination of hostilities, the general situation in the milling industry remains unchanged. To quote from the review published in FOOD MANUFACTURE in January, 1945: "Millers still have their wheats allocated to them by the Ministry of Food, are ob'iged to mill to a prescribed extraction from a stated wheat blend, and are required to attain a certain level of vitamin B_1 in their flour." It is true that during the past year the rate of flour extraction was raised to a level which exceeded even that imposed upon us during the darkest days of the concentrated submarine and air campaign against our shipping lines, but no outstanding advances in the technology of flour milling were forthcoming; the peak at which noteworthy progress in this field ceases to be practicable has been passed.

This article is the first of a series published each year on the different branches of the food industry. Written by specialists for the busy executive, they form a record of advances made during the previous year.

THROUGHOUT the year the official wheat blends for the production of National flour have consisted mainly or entirely of Manitoba and English wheat. The relative proportions in which these two wheats have been present have, of course, varied according to the availability of the native wheat. As in previous years, imported wheats, other than Manitoba, have at times been included in the grist, but a departure from the practice of recent years has been the utilisation of American wheats—namely, Northern Springs and Hard Winters.

In the late spring of the year, when the supplies of native wheat are becoming depleted, the official grists contain a much higher proportion of imported wheats than they do in the autumn, when new crop English is freely available. During 1946 flours were being produced in April from grists consisting of 10 per cent. English and 90 per cent. Manitoba, whereas in November grists contained 35 per cent. English with the balance made up of 50 per cent. Manitoba and 15 per cent. American wheat, the Hard Winter type of which is much below the Manitoba standard in strength. The flours being produced towards the end of the year were, therefore, appreciably inferior in protein content, strength, and water absorption to those being made eight months earlier.

Imported Wheats

In the early months of 1946 the Manitoba wheat imported was confined to the two top grades, but later a fair amount of No. 3 grade and some No. 4 grade arrived. These No. 3 and No. 4 wheats were quite up to standard for their respective grades, and, in fact, the flours they yielded did not exhibit in the dough the "deadness" and lack of life which has been a feature of these grades in some past seasons.

A comparatively small amount of Plate wheat was imported earlier in the year. These arrivals were wheats of the "filler" class—that is, they required no support from stronger wheats but, on the other hand, were not strong enough to carry any weaker wheat.

In the late summer, American wheats began to arrive, and these were mainly confined to Northern Spring and Hard Winter. These two types differ appreciably in protein content and strength. The Northern Springs, as a class, were almost up to the standard of the No. 2 grade Manitoba and hence were able to carry weaker wheats in the blend. The Hard Winters, on the other hand, were but little stronger than Rosafe Plate wheats and, in the main, rather less proteinous than the latter. The Hard Winters, therefore, ranked only slightly better than "filler" wheats.

Soon after these American wheats began to arrive some consternation was caused in the industry by an official warning that they might contain ergot and melilot seeds, and should be carefully examined for such impurities. Melilot seeds are not harmful to health, but they possess a strong smell—rather reminiscent of cherry wood—which may become imparted to the wheat and to the flour. Ergot, on the other hand, is toxic to both man and animals, and hence the presence of a significant proportion of this fungus in wheat would be a matter for serious concern. Although the bulk of the contamination should be removed during the wheat cleaning operations, the inclusion of the resulting "screenings" in the wheat by-products would have serious results upon the livestock to which they were fed.

Fortunately, however, the alarm was needless, since none of the American wheats proved to be seriously contaminated. It is true that many of the samples contained melilot seeds, but in no instance was the contamination great enough to cause trouble. A very small amount of ergot was reported in some samples, but in none of a very large number of samples examined in the author's laboratory was this fungus present.

Native Wheat

It is unfortunate that in a year in which it was found necessary to impose a new high level of extraction and to introduce bread rationing we were fated to be faced with a very poor native wheat crop. In many districts much of the harvested wheat became badly sprouted and in consequence exhibited an excessive alpha-amylase activity. If an appreciable proportion of such wheat is included in a bread-making grist, the dextrinogenic power of the flour will be such that the resulting loaves will possess a sticky crumb and may even collapse after leaving the oven. In pre-war days such deterioration in bread quality would have been avoided, because no miller would have included badly sprouted wheat in his blend, but would have adopted a proportion of English commensurate with the amount of sound grain available to him. The industry is, however, still controlled, and last autumn the orders were that 35 per cent. of English wheat should be included in the blend. Millers were, however, allowed to reject as "unmillable" native wheats which gave a maltose figure above 3 per cent. or in which 25 per cent. or more of the grains were sprouted. Not infrequently, however, wheats with fewer than 25 per cent. of the grains showing sprout will possess a maltose figure above 3 per cent., and, since a miller cannot have each small lot of English wheat subjected to a maltose test before deciding whether or not to purchase it, it happened that some wheats which would have been condemned on maltose figure were accepted on visual examination. Furthermore, in a district where the majority of the wheat was in bad condition, it might be necessary for a miller to employ some potentially "unmillable" wheat in order to maintain the required 35 per cent. of English. Despite the official dispensation which permitted the worst samples to be rejected, there was, nevertheless, a considerable amount of flour produced from blends which possessed an excessive alpha-amylase activity.

Extraction Rates and Analytical Data

During the first half of the year the extraction rate was raised first to 82½ per cent. and then to 85 per cent. These increases presented no difficulties to the miller, however, since each of the two rates of extraction had been in force previously. In mid-summer, however, the extraction was raised to 90 per cent. and remained at that level for about four months, whereupon it was reduced to 85 per cent. This increase from 85 per cent. to 90 per cent. led to a decided darkening of the colour of bread, which ceased to be of the "near-white" type. This is understandable, since the modified milling system devised for the production of 85 per cent. *flour* represented a stage at which all the endosperm capable of being separated reasonably well from the branny portions of the grain was being thus separated. The extra 5 per cent. of stock required to give a 90 per cent. product had of necessity therefore to consist to a large extent of fibrous and branny material. The ash content and the fibre content of the flour naturally, therefore, underwent an increase, but the vitamin B_1 content also rose.

Throughout the year an admixture of imported white flour, either Canadian or American, was made to the home-milled flour during the milling. The rate at which this admixture was made varied, but during most of the year was fixed at 10 per cent. The practice of adding *creta praeparata* to the flour, which had been in operation since the introduction of the 85 per cent. extraction Order during the war, continued, and, when the extraction was raised to 90 per cent., the *creta* addition was raised from 7 oz. to 14 oz. per sack. The intention behind this move was to compensate for the additional phytic acid introduced into the diet by the higher extraction flour.

When flours of different extractions are being compared the analytical data which are of particular interest are the values for the B_1, ash, and fibre contents. The ash and fibre figures, of course, serve as indices of the bran and phytic acid contents of the flours. Average figures for the various types of flour authorised during 1946 are given in the following table. The data obtained by the analysis

of commercial flours naturally differed somewhat from those quoted owing to the presence of admixed white flour and *creta*.

	Extraction.			
	80 Per Cent.	82½ Per Cent.	85 Per Cent.	90 Per Cent.
Vitamin B_1 ..	0·80	0·90	1·0	1·1
Fibre	0·20	0·30	0·40	0·80
Ash	0·67	0·75	0·84	0·98

When the extraction was raised to 90 per cent. there was a falling off in the baking quality of flour. The water absorption increased, but there was a loss of strength and liveliness due to the inclusion of the branny and enzymic fractions present in the additional 5 per cent. of stock.

Self-Raising Flour Regulations

At the commencement of the year an Order (S.R. & O. 1946 No. 157) was issued, which amended the Self-Raising Flour Order of 1944 (S.R. & O. 1944 No. 44). The original Order was amended in two directions; the method for the determination of residual carbon dioxide was specified in greater detail, and the limits for the carbon dioxide content of self-raising flour were altered. The need for the former amendment was emphasised by the author in last year's review.

Previously, a self-raising flour was required to contain not more than 0·65 per cent. total carbon dioxide and not less than 0·45 per cent. available carbon dioxide. There were two criticisms against these standards. Firstly, that the limit for available carbon dioxide was unnecessarily high, and secondly that the imposition of an upper limit for total carbon dioxide gave the manufacturer insufficient protection against loss of carbon dioxide from the flour during protracted storage. It is, therefore, gratifying to find that both these criticisms were met in the new Order. The amended regulations required no more than 0·40 per cent. available carbon dioxide in a self-raising flour, and placed no limit on the total carbon dioxide figure. The reduction of the available carbon dioxide figure from 0·45 per cent. to 0·40 per cent. meant that a self-raising flour could undergo a greater "run down" during storage before proceedings would be taken, but it in no way prejudiced the purchaser, since satisfactory goods can be made from self-raising flours which contain even less than 0·40 per cent. available carbon dioxide. The removal of the total carbon dioxide limit meant that a manufacturer could adopt whatever leeway he chose against loss of carbon dioxide during storage.

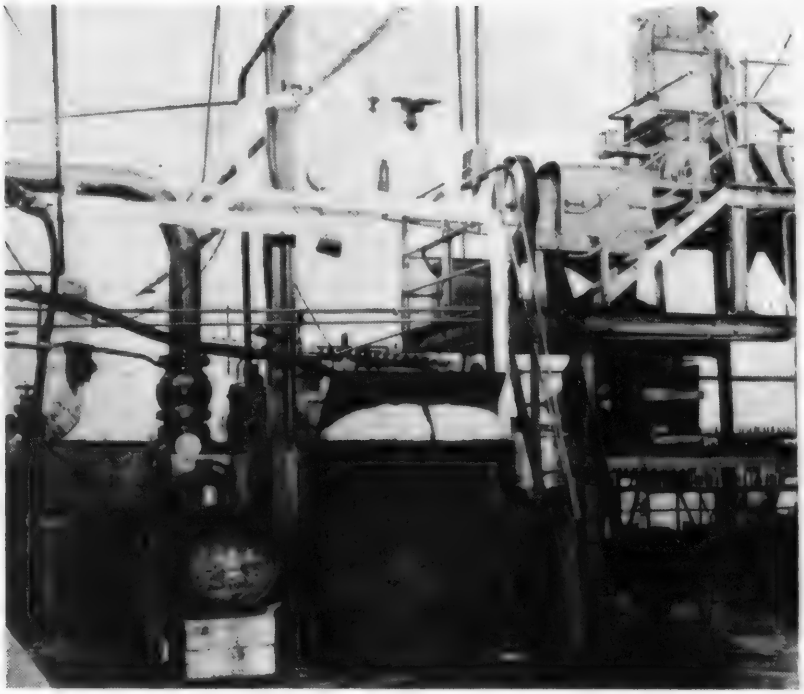
It is providential that the new self-raising flour Order should have been introduced before the advent of bread rationing. The opportunity presented to the housewife by the bread rationing scheme to obtain extra points by relinquishing B.U.s led to a pronounced fall in the sales of self-raising flour. Supplies of self-raising flour purchased by retailers prior to the introduction of bread rationing consequently remained unsold for an appreciably longer period than usual, and tended, therefore, to undergo a greater deterioration in strength. Had the 1944 Order still been in force much of these stocks would certainly have contravened the regulations.

Mite-Infested Flour Products

On several occasions during the year proceedings were instituted under Section 9 of the Food and Drugs Act against retailers of flour mixtures on the grounds that at the time of sale the goods contained living mites. In most instances, the retailer pleaded warranty, which meant that the manufacturer was brought into the proceedings. The author agrees that the presence of mites in a flour mixture entitles the product to be regarded as unsuitable for consumption (although not necessarily in any way harmful), but he considers that the attitude of those local authorities who prosecute in such a case in the present circumstances is one to be deplored. The Food Salvage Officer should be informed so that the stock can be condemned and utilised for, say, the production of dog biscuits, but the institution of proceedings may very well lead to the original manufacturer being penalised for a happening which is quite outside his control. In fact, it would be no more illogical to penalise the miller when an outbreak of rope in bread occurred because the bacteria rendering the bread unsuitable for consumption came from spores originally present in the flour. It is doubtful whether a sack of flour is ever made that is completely free from either rope spores or mite eggs, and whether these develop into bacteria and mites respectively is governed entirely by the treatment the flour receives after it has become the property of the retailer.

Mites gain access to a mill from the incoming wheat, and, although adults will be removed by the fine silks used to dress the flour, mite eggs will not be thus separated. The eggs of mites are only about 1/300th inch broad and will pass through even a No. 14 silk. The number of such eggs gaining access to flour during the milling process will be greater the higher the proportion of outer skins included and hence the higher the extraction. The flour being produced during 1946, and particularly the 90 per cent. flour, therefore had on this score alone a higher mite egg content than did pre-war white flour, but the position was worsened by the

(*Continued on page* 35)



The purée-making plant of the Jersey Canners, Ltd.

Tomato Canning in Jersey

A description of the operations at the factory of Jersey Canners, Ltd., whose main activity is the canning of tomatoes which, with potatoes, form the principal product of the Island.

ON the little island of Jersey, around the entire coast of which it is possible to ride comfortably in a car in one afternoon, there has grown up a prosperous and expanding canning industry which, although subsidiary to the tomato crop upon which it is dependent for supplies, bids fair to make a reputation even greater than that of the crop itself.

The foundations of the present canning industry were laid thirty-six years ago when a group of French business men purchased a plot of land in the centre of the outdoor tomato growing district of Greve d'Azette, in St. Clement's parish, and erected the first machines for canning such produce.

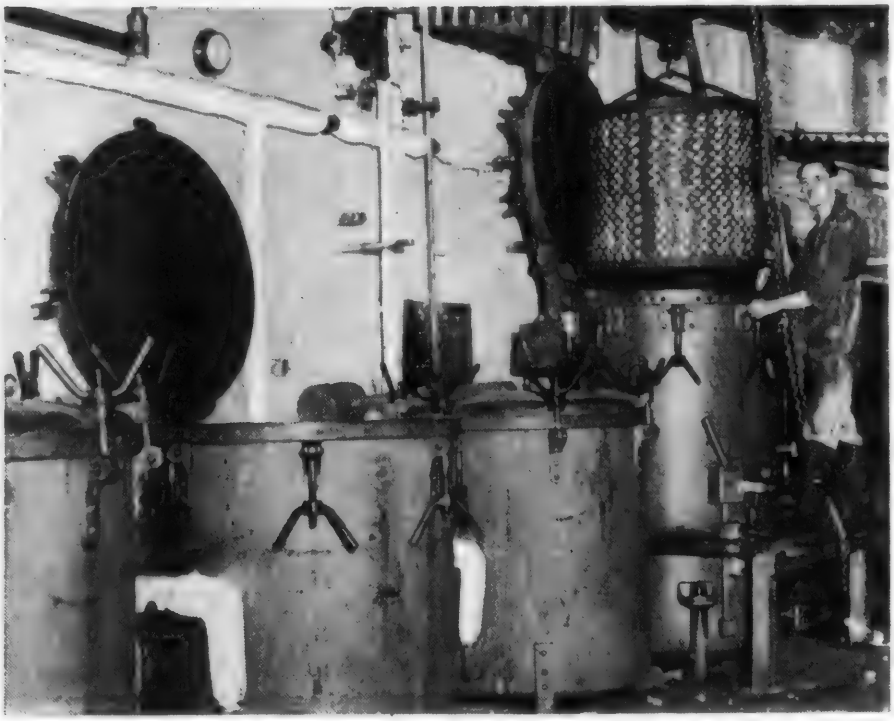
Public prejudice was strong in those days against tinned food, and echoes of the Chicago stock-yard scandals were still in the air. Even some of the producers of fruit who stood to benefit from the establishment of a cannery in their midst would have nothing to do with it and refused to sell their fruit for the purpose of preservation.

At that time the price obtaining for tomatoes left little margin for the canner to work on as, during the season, exports were so great that the public in England could eat their fill throughout the summer and consequently did not mind the few months during which the fresh fruit was unobtainable. Certainly there was not the demand, even in winter, for canned tomatoes, that has arisen since those pioneer days.

On the other hand production was definitely more crude and the output insignificant compared with that of the present day, but labour and materials were then cheaper on the island than they were elsewhere.

Effects of the 1914 War

So the original company struggled gallantly on with their new venture until the first of those wars



A battery of retorts for processing new potatoes and other vegetables.

which were to teach the world how to live almost entirely on the contents of tins broke upon the peaceful little island.

The entire executive and many of the staff of the company, being of French nationality, were immediately called up for service with their country and the premises were closed down "for the duration," but as things turned out it was not until 1926 that they again opened for business, under different management.

Success was not forthcoming, however, and for a period the factory experienced a varied existence, being used as a store, a wood-yard, and for other purposes, until in 1933 a group of far-sighted business men, realising its possibilities, re-organised the company and restored the premises.

With Colonel Johnson as managing director and Mr. J. S. Norman as manager, a determined effort was made to place the factory on a remunerative footing. Four years later Mr. Norman became managing director, a position he holds today. To the efforts of these two gentlemen and their willing and competent staff is due the success which the company has achieved today and the position it holds in business circles on the island and in the world beyond.

Installation of modern machinery and plant was essential for the revival of the moribund company, and new buildings to house the equipment of the factory had also to be erected. This was done and the output of the factory was steadily growing as the popularity of the firm's products increased, when along came European War No. 2.

This time, however, the factory did not close. There was work of importance to be done and it worked harder than ever. Then came the swarm of German locusts to settle on the island, and the factory was needed to prepare food for the islanders themselves. Under the shadow of an enormous gun-pit erected by the invaders to repel invasion on the peaceful sandy bay within a stone's throw of the factory, the work of preparing food for their fellow islanders went steadily on.

Far from ignoring its existence, the Germans commandeered its products when they desired them, although they did not requisition the premises.

Throughout that long, weary time of trial Jersey canners carried on. At the date of occupation a new warehouse had just been erected, and in it was a stock of 50,000 tins of tomatoes and a further 750,000 empty cans.

During that time there were no tomatoes grown on Jersey, but the glasshouse crop raised on the instructions of the occupying forces in Guernsey

was sent to the factory to be processed. However, local potatoes were preserved, as well as beans and other vegetables, which were stored against the winter needs of the civilian population.

Problems of Peace-time

Now that the problems of peace once again replace those of war the Company is rapidly regaining its place in the markets and getting back into its stride towards prosperity. The old feeling of antipathy among the island growers towards canned goods has died out, and it is realised by producers as well as consumers that only the best is good enough to be preserved. Whole-hearted co-operation between growers and canners is now recognised as the normal way of assisting in the disposal of the tomato crop, and the possibility of raising additional crops especially for disposal to the factory is now being discussed.

To this end Mr. S. W. Smedley, of the well-known firm of canners, is to visit Jersey* at an early date for the special purpose of addressing farmers and encouraging them to undertake the cultivation of crops such as peas and beans, solely for canning. This is essential if production is to be kept up to full pitch all the year round, as the tomato season is a short one.

Other Products

Tomatoes are not by any means the only product of this factory today. Jersey new potatoes are also a standard line which finds a ready sale. Especially is this so since the war when, as a result of the German legacy of the Colorado Beetle scourge, fresh potatoes from the island have been banned on the English markets.

This embargo does not of course apply to the canned crop, and this year exports from the island to England of canned new potatoes have amounted to 6,000 cases.

Other lines processed in the factory are the famous baked beans, tomato *purée*, blackberries, and peas.

Apart from wild crops gathered from the hedges there are no fruits grown on Jersey in quantities to make canning profitable. Imported fruit such as plums have been processed, but the cost of transport to the island, even if the fruit is bought on a glutted market, with consequent loss by waste, makes this an unprofitable venture.

The possibilities of dehydration of local milk have also been investigated, but the supply is too irregular, being dependent upon the state of the pasturage for any surplus milk over local requirements, to justify its adoption.

* For note on Mr. Smedley's visit, see page 36.

Canned tomatoes coming off the bench.

Weather Factor

The weather is indeed a most important factor in the plans of this factory, as supplies are limited to such a small area and cannot be drawn from other districts which may have been unaffected by any adverse conditions experienced locally. Thus this year the cold summer delayed the ripening of the tomato crop to such an extent that the season was an extremely short one, during which work had to be conducted at high pressure and necessitated overtime and other charges which added considerably to the cost of production.

Despite this, the present output of canned tomatoes has been in excess of 750,000 tins, or treble that of any previous year. In addition some 60,000 × 7 lb. cans of tomato *purée* have been exported, as well as hundreds of tons of the pulp in casks.

Capacity at present is up to 40,000 × 30 oz. cans and 1,500 × 7 lb. tins daily, and at peak of production the staff amounts to 130 hands. The latter are mostly local labour, though this year a few of the 500 Welsh girls specially imported to

work on the tomato crop have found positions at the factory benches. There is no floating labour on an island such as Jersey, and employers who require hands in the busy summer season have responsibility for them throughout the winter months.

The Canning Process

On arrival at the factory the boxes of tomatoes are emptied straight on to a conveyor belt upon which they are sorted by hand and eye by skilled workers. The fruit is discarded here if it shows blemishes, and is subsequently re-sorted, the best of the residue being used for *purée*.

After this inspection the tomatoes pass into their first washing machine. Emerging from this they again pass along a belt for further examination, during which the calyx is removed and any further faults in quality are detected. Here the actual canning takes place, this being done by hand before the packed tins pass through a machine in which they are filled with hot brine.

Still on a conveyor belt, the cans are taken through the exhaust box, in which they remain for 15 minutes, after which they proceed to the double seamer.

The next step is down the chute to the automatic rotary cooker, in which sterilisation takes 19 minutes, after which the cans enter a rotary cooler for a quarter of an hour. They are then packed in fibrite cardboard cases for a couple of days before being labelled by machine and repacked for export. The time taken from delivery of the fruit by the grower until it has been processed up to the cooling-off stage is approximately one hour.

The time taken to cook and the temperature at which cooking is carried out depend upon the state of the fruit, its ripeness, and size, but for high pressure sterilisation, such as is required for potatoes and peas, there are four vertical retorts.

The making of *purée* is the second largest operation at the factory. The fruit passes up a belt to the pulper, from which it is expelled into the finisher which removes all skin and seeds. The juice passes into a stainless steel pan where it is heated and then sucked up into a vacuum evaporator lined with enamel and silver.

Here it is evaporated until it contains the correct proportion of solids, when it is canned and sterilised in special retorts.

Strict laboratory control is exercised to standardise quality. A routine test is made hourly, when a can is selected at random and examined.

Increased Production

Besides the new machinery which has been installed since Liberation, it is planned still further to increase production by additional extension of plant and, if necessary, of premises. There is scope for such a factory, and it is serving a useful purpose to the tomato-growing community of the island by absorbing fruit which might otherwise spoil and waste.

This was instanced this year when, due to the cold, dull weather, ripening was delayed and then, with a few days' sunshine, the fruit came along all at once. The result was a glut on the English markets and congestion in Jersey, where the tomatoes were going down to the boats faster than the inspectors could examine them or the dockers could load their boats.

By the time their turn came in the queue many consignments were over-ripe for shipment, though otherwise in perfect condition. Had it not been for the canning factory many thousands of tons of fruit would have been wasted. To relieve this congestion picking was stopped for two days, which meant that again there was an accumulation of fruit which was too ripe for shipment, and once more growers were glad to turn to the factory to relieve them of their surplus.

Raising Crops *ad hoc*

It is to be hoped that the proposals to raise crops entirely for preparation by this factory will result in operations which will be mutually beneficial. There is an opportunity here for an additional, if not actually alternative, form of cultivation for the growers who would, on the average throughout the whole season, realise as much in this way as by attempting to supply markets outside the island, and would also enable the factory to keep at the peak of production all the year round.

The whole of the processes dealt with here are contained under one roof in light and airy surroundings, and despite the spoilation of the neighbouring scenery by the Germans, there is one of Jersey's widest bays just across the road on which the staff may spend their dinner hour if they wish. A comfortable canteen is provided for the use of employees at which light meals are available. Judging from the smiling faces that greet the visitor the factory is "a happy ship."

BOOKS RECEIVED

Practical Methods for the Microbiological Assay of the Vitamin B Complex and Essential Amino Acids. By E. C. Barton-Wright, D.Sc., F.R.I.C.

The Advertising of Chemicals and Allied Products. By Alexander St. Clair Geddes, Ph.C.

British Standards Yearbook. Published by the British Standards Institution.

Ozone in Cold Stores

The employment of ozone in cold storage rooms used for food for the elimination and prevention of taint was described by Mr. F. H. Vidler at a recent meeting of the Institute of Refrigeration. Ozone, subject to the necessary control and safeguard, is an important aid in preventing the deterioration of foods in cold storage.

MARMALADE and potted meat manufacture are the principal industries in a small Scottish town. Both are seasonal. At a time when the cold storage rooms at the meat factory were half full of veal the manager of the marmalade factory was expecting a large consignment of oranges. He approached the manager of the cold store with a request to store his oranges, which was granted.

A few months later letters poured into the meat factory from angry consumers complaining that the potted meat possessed a marmalade flavour. This cost the potted meat firm something in the region of £1,500.

Mr. Kenneth Lightfoot, President of the Institute of Refrigeration, recounted this episode to give point to a paper on "The Use of Ozone in Cold Stores," read by Mr. F. H. Vidler, A.Inst.R., at a meeting of the Institute on November 12. Mr. Vidler made it clear that if so little as 0·5 parts per million had been present in the chamber there would have been no danger of taint.

Uses of Ozone

Mr. Vidler surveyed other uses of ozone in cold storage. It can be used to remove taint from cargoes of foodstuffs which would otherwise be condemned. Taints of fuel oil, smoke, orange, and apple have all been successfully removed by ozone treatment. In treating meat, carcases should be stacked to allow free circulation of ozonised air; in a 500 ton chamber, for example, it is advisable to stack only 300 tons.

Ozone has also been used for purifying chambers and storage spaces which have been contaminated with clinging odours, such as that of oranges. This has permitted a quick turn-round of ships and rapid change of goods in store. By ozonisation of a chamber meat can be stored a few hours after the removal of oranges.

In minute doses (*e.g.* 0·1 p.p.m.) ozone treatment delays ripening of fruit, thus prolonging storage time. The ozone oxidises ethylene given off by ripe fruit, which otherwise accelerates ripening, but overdosing must be avoided as it will hasten decay.

As a bactericide ozone will kill surface bacteria on infected meat but, since its penetration is small, its use is not recommended. As a fungicide ozone is of much greater importance, particularly where eggs are in store. According to the U.S. Department of Agriculture 83 per cent. of egg storage rooms in the U.S.A. are fitted with ozone generators. Ozone completely prevents growth of moulds, possibly by inhibiting growth of the phytae which cause proliferation of fungus. Meat is preserved in a similar manner.

Ozone Generation

Mr. Vidler enumerated the qualities of the two main types of generator—the plate type and the tube or valve type—and outlined the best conditions for their use. Output of the plate type is determined by the number of electrons produced. The electrons bombard the oxygen in the air with sufficient force to combine the molecules, thus forming ozone. The voltage, which usually varies between 3,400 and 7,000, also affects output.

In the tube or valve type of ozoniser Mr. Vidler recommended use of a capacity earth in the form of a corrugated dielectric formed of a non-oxidisable metal, such as aluminium. With this type of construction, even in very high relative humidities, it is practically impossible for a complete film of moisture to form on the dielectric, thus reducing the possibility of destruction of part of the ozone by sparking. With the plate type a relative humidity above 60 per cent. causes considerable reduction in the production of gas. Increase in relative humidity always decreased ozone production.

One of the dangers encountered in ozone generation was simultaneous production of nitrous compounds. With the tube type of machine this possibility is obviated, the electrical discharge being contained in an enclosed glass envelope. With the open plate type, on the other hand, the high relative humidity and possibility of sparking made production of nitrous acid a constant danger.

Among general requirements for an ozone generator Mr. Vidler mentioned that it should be

compact and portable, as it occupies valuable storage space; the output of ozone should be controllable; the ozone should be freely circulated, if necessary by an apparatus fitted on the machine; heat production must be as low as possible; and electrical consumption, though normally not large, should be kept at a minimum.

In removing taint, ozone oxidises the highly unsaturated substances which cause taint and converts them into saturated, non-odoriferous substances. The offending substance is diffused around the surface of the contaminated product in a gaseous form; as this is destroyed by the ozone so more gas diffuses out and is in turn destroyed until the taint is completely removed. The ozone is then absorbed into the surface of the foodstuff and destroys the offending substance itself.

Discussion

The claim that most of the research on ozone had been conducted in this country and not in the U.S.A., as Mr. Vidler had suggested, was made by Mr. E. F. Cowell, A.M.I.H.V.E., of Ozonair Ltd. He considered that more research was needed to devise a system for ascertaining the concentration of ozone in a chamber without opening it. Mr. Vidler, replying, stated that a method had been worked out which he expected would shortly be commercialised.

Mr. Cowell also emphasised the danger of over-ozonisation, which Mr. Vidler agreed was extremely undesirable and liable to cause a rancid taste in butter as well as accelerating decay in fruit.

Another speaker warned users of ozone that the gas had a destructive effect on rubber. Rubber electrical insulation should either not be used or should be protected.

In reply to further questioners Mr. Vidler stated that the presence of ozone did not affect rate of freezing; that the power required to ozonise a room of 150 cu. ft. was approximately 6 watts; and that both types of generator produced some nitrous compounds, although, if correctly used, never in harmful quantity.

Off Flavours in Dried Egg

ONE of the complaints levelled against dried egg powders was the "cardboardy" or "musty" taste which, with varying measure of success, was masked by various culinary devices. Although dried egg powder has more or less disappeared the problem of "off-flavours" developed on storage has remained and, according to recent papers (*Ind. Eng. Chem.*, 1946, **38**, 1075, 1079, 1082), is receiving earnest attention. Storage in carbon dioxide gives a marked increase in storage life, and if the product is adjusted to *p*H 5·5 before drying and then stored at 20° C. in carbon dioxide the shelf life can be extended to 2 to 3 years.

The source of the off-flavours has been traced to the deterioration of the egg yolk of which the phospholipid fraction undergoes characteristic changes giving the unpalatable properties to the whole powder. It is interesting to note that the phospholipid-free lipids, separated from whole eggs, develop rancidity when stored separately, but that in the presence of the phospholipids this does not occur, so that it appears that the phospholipids act as anti-oxidants but, in doing so, are themselves affected and develop the characteristic off-flavours and off-odours of egg powder.

References have been made several times in these pages to the fluorescence test and its connexion with palatability of egg powders. From this latest work it appears that there is no connexion between the salt-water fluorescence of individual fractions of egg powder and palatability, the changes measured by fluorescence playing only a minor role, if any, in the palatability of the stored fractions. Appreciable increases in fluorescence occur only when egg-white is stored, either alone or in combination with egg fats; with palatability the reverse is true. Olcott and Dutton (*Ind. Eng. Chem.*, 1945, **37**, 1119) showed that separated yolk proteins, as well as egg-white proteins, give rise to fluorescing products when they are allowed to react with glucose. It seems that the higher values obtained with whole eggs are due to the summation of the reactions of the proteins from both the egg-white and the yolk with glucose. Fat soluble fluorescent substances are formed during storage and appear to be derived from the reaction of the amine groups of cephalin with aldehydes. This reaction accounts for the discoloration and the development of fluorescence in the egg lipids during storage of egg powders. In the latest papers the salt-water fluorescence values and the fluorescence of ether extracts of whole dried egg powders have been compared with palatability "ratings" of the products. If the powders contain high moisture content (4 to 5 per cent.) the salt-water fluorescence values correlate very well with palatability, but with powders with 2 per cent. or less moisture present the correlation was poor. This serves to explain the contradictory nature of the results of previous workers on this subject. The lipide fluorescence values, however, correlated well with palatability whatever the moisture content of the stored powder and with all classes and grades of powder. Thus both the fluorescing substance and that responsible for off-flavours appear to originate in the phospholipid fraction of egg powders.

Oranges being picked from trees in a Palestine plantation.

The Palestine Fruit Industry

ERIC HARDY, F.Z.S.

Since the British mandate organised industrial development, Palestine has become one of the most valuable fruit-exporting countries in the Mediterranean and in the Near East. Owing to the detrimental effect the war has had upon the citrus trades of Spain and Italy, that of Palestine will assume comparative importance in the post-war period. Much progress in British-sponsored scientific horticulture has been made to improve the growing of pomegranates, melons, almonds, grapes, apricots, and apples for marketing in the United Kingdom, and also in improving the production of olive oil and the brining of cucumbers for export.

THE Jerusalem Ministry of Agriculture maintains eight fruit-growing research stations where new strains and sub-tropical plants are introduced and production problems dealt with, while the Jewish Agency maintains a large research station at Rehovat covering all branches of production specially catering for the various Jewish settlements or self-supporting and exporting village communities of settlers and refugees. The Government research stations deal with horticultural and field crop work, with deciduous fruits, vines, pomegranates, olives, vines, dates, and sub-tropical fruits. Jericho has a station specialising in dates, bananas, and vines.

Three kinds of melon are produced in Palestine—the water-melon, the sweet or honey-dew melon, and the cantaloupe. The large, bulky water-melon is of low commercial value, and it is not likely that this variety will be exported to any great extent; the highest price is obtained for the pink-fleshed, ribbed, greenish-yellow cantaloupe.

Pomegranate growing in Palestine is now a flourishing industry, the biggest areas of cultivation being around Nazareth, Acre, Tulkerem, and Haifa. There are sweet and sour varieties, the main ones being the Mellissi, the Luffani, and the Tas-el-Baghil. The first trial export to the United Kingdom was made in October, 1930; the fruits were wrapped individually in tissue paper and packed in wood-wool in orange boxes, but they were too ripe when picked and tended to decay in transit; insufficient packing caused bruising, and they were also attacked by insects.

The Grape and Fig Industries

The growing of table grapes for export is an important industry, principally in the areas of Acre, Bethlehem, Ramallah, and around Jeru-

Oranges dumped in huge piles on the ground, over which sacking has been spread.

salem. Muscats are canned in a small way, but the most profitable use for surplus grapes is in the form of raisins. Grape jam is made and there are prospects of a grape fruit juice being produced for export.

Extensive fig crops of several varieties are grown in the mountains and Arab villages; the Kadota variety may be canned for export, made into jam or into a paste or pulp for biscuit filling on the lines of the Damascus apricot. A large proportion of the crop is dried and exported in competition with the Smyrna fig, which has also been introduced into Palestine, but without success.

Soft Fruits

Apricots are extensively grown and are exported in competition with Spanish and French fruits; although rather small, they are of good quality. They may also be canned when of a rich golden colour, chiefly the varieties Americani and Mustakawi, to compete with Californian, Australian, and South African apricots canned in syrup. In Damascus apricot paste is commonly made, while there is a big export demand for the jam. This fruit may also be used for ice cream pulp and for crystallised fruits.

Only small quantities of peaches and plums are grown, too small to provide a canning industry, but the amount of strawberries under cultivation is increasing. The "Champion" has proved the best of imported European varieties, which may have a future for jam-making.

Almonds from Palestine

There is a large cultivation of almonds, but in many southern districts former almond orchards have been replaced with orange groves, and in the northern part of the country border pests and gummosis disease have taken their toll. The majority of almonds are of the hard-shelled variety, less than a quarter being soft-shelled. The Greek variety forms a very large percentage and the Victoria variety about 40 per cent. The greatest demand is for Victoria, Greek, and hard-shelled sweet almonds, large quantities of which are taken by Damascus and Egyptian buyers. The European export is mostly for the unshelled almonds, and Palestine has here to compete with products of Italy and Morocco, where large quantities of bitter and sweet almonds grow wild and undeveloped. However, the kernels of Palestinian almonds excel these in flavour and sweetness, but production and weight costs make it almost impossible to place Palestine unshelled almonds on the Central and Western European markets. Before the war they sometimes brought high prices in France, and shipments have been made to the U.S.A., India, and China.

Citrus Fruits

Despite the necessary war-time restriction in the area devoted to the production of citrus fruits, damage to the crops and the country's production capacity has not been as much as was expected. Out of 230,000 dinams (a dinam is about a quarter of an acre) under production, about 25,000 had been dried up. The position of export trade to Britain and America in the post-war period depends largely upon the number of ships available with refrigerators. Much progress has, however, recently been made with the use of wax-proofed wrapping paper for shipped cargoes. Mr. F. R. Mason, Director of Agriculture and Fisheries to the Palestine Government, stated recently that Dr. Farkas had developed the use of fruit-wrapping paper impregnated with diphenyl, originally produced by Dr. R. G. Tomkins,* of the Low Temperature Research Station, before the war and by the Crown Willamette Co., of San Francisco.

Palestine firms are canning a certain amount of jam manufactured from the citrus crop, but sugar supplies are restricted and there is a heavy duty. Before the war Palestinian jam canners imported their sugar from Java, but it is stated that if the industry is to export to Britain sugar will have to be imported free.

Oranges, Lemons, and Grapefruits

The orange was traditionally brought from India to Palestine via Oman about a thousand years ago, and the different soil and water altered its Oriental perfume and flavour. Apart from the "Valencia Late," there are three main varieties of sweet orange grown in Palestine: the Shamuti, the Beledi (native), and the Fransawi (French). The Shamuti is a comparatively recent novelty and is closely associated with Jaffa and its immediate neighbourhood. The name generally used for sweet oranges in Palestine and Egypt is "burtuqan" or "burtuqal," suggesting Portugal, and it is known that Portuguese traders naturalised the Indian sweet orange in Portugal in the sixteenth century and were exporting it to European countries early in the seventeenth century.

The lemon was probably introduced to Palestine about the same time as the sour orange. In the twelfth century a Jewish physician wrote a complete treatise on the lemon, which must have been under cultivation then in Egypt, Palestine, or Syria. The grapefruit was imported into Palestine from the U.S.A., but the shaddock, cultivated since the Middle Ages under the name of Adam's Apple or Paradise Apple, may be the parent plant of the modern grapefruit. The mandrake was not introduced until about 1825 from China.

* Food Manufacture, April, 1945.

Citrus Diseases

Dr. Reichert, plant pathologist at the agricultural experimental station at Tel-Aviv, has listed the chief diseases responsible for damage and great loss to citrus fruit destined for export. When the former Empire Marketing Board was in existence, numerous experiments were made in conjunction with that body on all aspects of citrus fruit export and packing. Subjects studied include the risks of damage to fruit wetted with sea water during transport in lighters from the stores to the ship, the use of thermographs to record the temperature of ships' holds transporting oranges, the condition on arrival of fruit allowed to wilt for different periods between picking and packing, the relative carrying qualities of fruit from different soils, and tests of the damage done to the keeping quality of fruit by opening the case for inspection, of fruit picked before and after rain, and of artificially coloured oranges.

Insect Pests

The extent of the total damage caused to the citrus industry in recent years by insect pests is increasing with the age of the groves. The three worst pests are scale insects, Mediterranean fruit fly (which is also a pest in American orchards), and red spider. The age of the trees increases the shade surface, which encourages the sap-sucking scale bugs. Certain scales previously unknown in Palestine have suddenly spread to new and considerable areas. Black scale, mussel scale, and red scale among the "armoured" group, and wax scale, soft scale, and olive-black scale among those without a body shield, are the chief causes of the damage. Black scale is now to be found in the famous Jaffa area in the south as well as in the Upper Jordan valley. It is controlled with liquid hydrocyanic acid fumigation. Mussel scale has also spread to new areas from its original source at Petah Tikvah in the country.

Fruit Fly Damage

Fruit fly damage has not been serious since the 1935-36 outbreak, but it has become a relatively recent pest in the Jordan valley citrus groves. Fruit fly damage in Palestine varies from year to year. Although endemic, it becomes a serious pest in cool summers. In the 1935-36 outbreak up to 50 per cent. of the Jordan valley citrus crop had to be culled. It attacks all citrus fruits, but lemons only slightly. It also attacks figs and grapes and encourages the spread of *Penicillium* mould by puncturing the orange rind. It is best controlled by winter spraying with a solution of copper carbonate and molasses or sodium fluosilicate.

Food Yeast Developments

Full-scale production of food yeast is expected to start early this year. Already small quantities are being produced in the factory built in Jamaica with funds provided by the British Government, but these are being sent to Malaya as a measure of relief feeding. The decision to set up the factory was taken in 1944 after research and pilot-plant production in the Chemical Research Laboratory of the Department of Scientific and Industrial Research.* In an interview given to FOOD MANUFACTURE Dr. A. C. Thaysen, who has been closely associated with the development of the process, described how the plant is now run and explained how the inevitable difficulties of conversion to works scale production have been met.

ECONOMICALLY and socially, the significance of the discovery that the yeast *Torulopsis utilis* is unusually efficient in the production of protein from carbohydrate materials rests on the fact that Colonial prosperity has been largely built up on cheap labour and plantation monoculture. Colonial pioneers of the nineteenth century had no forebodings about the pressure of population on the means of subsistence resulting from reliance upon a few staple crops. Throughout history it had been the predominantly carbohydrate foods, such as wheat and rice, upon which aggregations of population had depended and there was no reason to suppose that any difficulty would be found in providing sufficient quantities of these energy foods. The result of this extreme specialisation has been the destruction of local mixed-farming systems, soil impoverishment, and unbalanced diets deficient in vitamins and protein. At the same time, low wages prevent the plantation hands from buying the more expensive protein foods, even if they were available.

Use of By-Products

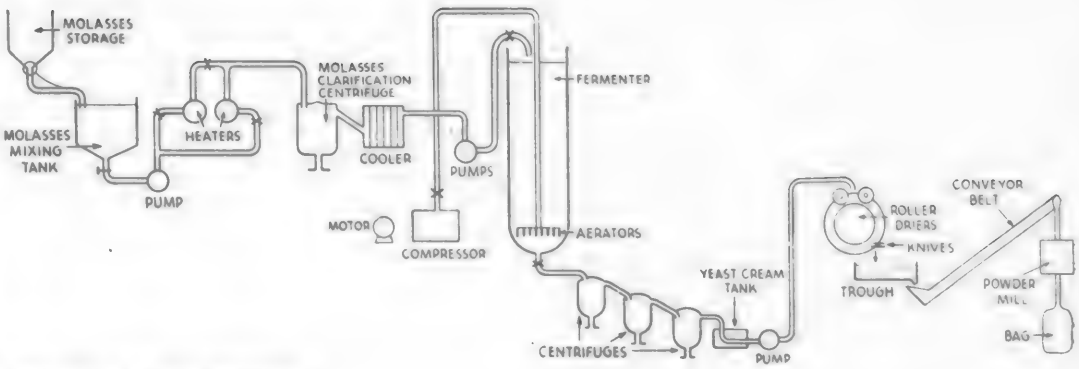
It was, no doubt, the technical successes of Continental chemists during the war of 1914-1918 in making use of fermentation processes for the production of diet supplements which turned the attention of Colonial administrators to the one favourable factor in the situation—the existence, as a consequence of monoculture, of large quantities of agricultural wastes and by-products containing carbohydrates which might be transmuted into protein foodstuffs by the agency of micro-organisms. When it was shown by the work done at Teddington that the D.S.I.R. process gave hope of providing such a food at a low price the Colonial Office provided, through the Colonial Development Board, a grant of £25,000 to enable a food yeast factory to be started in the British West Indies. Although the choice of location was dictated by the availability of sugar by-products not fully, nor economically, utilised by alcohol production, the projected plant was regarded as a works-scale experiment which would be a prototype of similar factories to be erected in places where conditions of malnutrition and poverty co-existed with accumulations of carbohydrate wastes and by-products.

From Pilot Plant to Full Production

The factory was completed in May, 1946, but full production was delayed by the problems which invariably crop up when production methods are translated from pilot-plant to works level. Variations in climate from temperate Teddington to tropical Jamaica no doubt added to these difficulties. The economic background also underwent a change, and falsified early estimates. Demands for alcohol enlarged by America's synthetic rubber programme had the effect of quadrupling, to £8 per ton, the cost of the molasses used as the raw material of the process. Estimates made in 1942-1943 led to the hope that food yeast could be sold at less than 6d. per lb.; the *ex*-factory cost for bulk quantities is now put at between 6d. and 1s. per lb., depending on the cost of molasses at the time of manufacture. To cover distribution and packing costs the price of small packages sold by retail will, of course, be higher.

The Imperial Government and private interests have collaborated in operating the factory. Although the plant—located at Frome, Jamaica—is owned by Colonial Food Yeast, Ltd., all the shares

* *See* FOOD MANUFACTURE, *September*, 1944.



Flow sheet of yeast production.

of which are held by the British Government, it is run by the West Indies Sugar Co., and electric power, steam, and water supply services are shared with the nearby Frome Central Sugar Factory and Distillery. About a hundred workpeople are employed, working three shifts a day, with three scientists to supervise the process.

Production Method

Chief source of carbohydrate in the Jamaican factory is molasses, but alternative supplies of sugar juice or raw cane sugar are available if necessary. In principle, the process is to mix the molasses solution with water, heat to boiling point by passing through heated coils, and transfer to a tank where the boiling wort solution is mixed with superphosphate. The mixture, while still hot, is neutralised with soda ash or sodium hydroxide, which gives rise to a heavy precipitate forming in the wort solution. This may be separated either by settling in a tank for two hours or by centrifuging. The hot wort then passes through a heat exchanger, where it is cooled to about 30° C., the temperature needed for the yeast fermentation with the organism *Torulopsis utilis*, which is the next stage. On leaving the fermenters the yeast passes through two separators, which remove the bulk of wort that is left.

The yeast is in the form of a cream when it leaves the centrifuge, whence it passes straight to roller driers, knives at the side of which scrape the dried yeast off into a trough. The yeast is conveyed upwards by a conveyor to a pounding machine, in which it is ground to a fine powder before being passed to the hopper for packing. The powder weighs about 30 lb. a cubic foot, has a somewhat meaty flavour, and resembles a finely ground, pale cream sawdust.

Jute bags lined with asphalt paper to prevent the penetration of moisture and capable of holding 1 cwt. of food yeast are used for packing. Twenty-eight-pound tins are also used occasionally.

Disposal of effluents is of primary importance, as they are highly polluting. At present they are run into the sea, but plans are in hand for their more economic disposal. They consist mainly of residual sugar and colouring matter, organic nitrogen, yeast cells, and bacteria.

All the machinery for the plant was specially made in Britain, and it is to the equipment used in the preparation of the wort that the chief production difficulty has been attributed. This contaminated the yeast with iron, which had the effect of retarding the growth of the yeast cells. Since this trouble did not arise in the fermenter, as this was made of stainless steel, the difficulty may be remedied by lining the required machinery with a similar metal. Another difficulty was an insufficient air supply in the fermenter, which will be remedied by installing more air compressors. While these alterations are being made to the plant, simplifications will also be carried out, for it has been found that neither filtration through filter presses nor automatic delivery of wort to the sugar fermenters is necessary. When all these adjustments have finally been completed, output of yeast is expected to reach 12 to 15 tons a day, for which between 50 and 60 tons of molasses will be used.

Cheap labour is not essential to production, and, providing there is a good water supply, facilities for disposing of effluents and plenty of raw material available at an economic price, a food yeast plant can be successfully operated in most countries.

Parallel Developments

Production of food yeast is not a new idea; it was originally made in Germany during the 1914-1918 war from beechwood and was sold to occu-

pied countries during the recent war at about 2s. a lb. Food yeast has also been made from wood sugars in Sweden, where it is mixed with cellulose to give additional nutritional value and then fed to cattle. A plant has also been built in South Africa, which is not yet operating. Other countries which have made enquiries about the British process include Czechoslovakia, India, Puerto Rico, Palestine (where citrus wastes would be the carbohydrate used), Brazil, and Mexico. Preliminary experiments in Puerto Rico are reported to have been disappointing, and nutritionists there are understood to have formed the opinion that the food value of the yeast is not so high as had been hoped.

In America, the breweries of Anhäuser in St. Louis are experimenting with the process for the purpose of utilising brewer's yeast. According to the North-Western Wood Utilisation Council, sawdust, cornwood, and other types of industrially useless wood might also prove a source of unlimited supplies of yeast containing vitamin B. In addition, it has been estimated that the Springfield, Oregon, wood-alcohol plant, which has a daily output of 500,000 gal. of waste liquors, could produce 12,500 lb. of dry food yeast daily.

At present there is an extremely small yeast industry in India, which has been developed as a by-product of the brewing industry. It is thought that if this could be expanded there would be a strong demand for the product, in view of the fact that 75 per cent. of Indians are vegetarians and are therefore unable to rely on meat as a source of protein, or, even if permitted by their principles to drink milk, unable to afford it.

Following the visit of two Mauritius officials to the United Kingdom last year to study the production of food yeast, it is reported that a plant is under construction there.

In Germany during the war the sulphite liquor left after beechwood had been pulped was used to produce food yeast.[1] In this process, which is continuous, the liquor is neutralised with lime and inorganic nutrients are added. The fermentation vessel is a large tank, in which compressed air is used for circulating and aerating the liquor. On leaving the tank the liquor passes to two others, which raise the yeast concentration from 2 to about 10½ per cent. The yeast is then thickened in drum filters and finally spray-dried. Two qualities are made, one for cattle food and another for human consumption, the price of the latter being about half that of lean meat.

British Developments

There are no concrete plans in Britain for the establishment of food yeast plant, and it is likely that more informative results of the Jamaican plant are awaited. Plans made in 1943 for erecting a factory in this country were abandoned owing to the cost of transporting the molasses, and the company called Food Yeast, Ltd., which was formed for the purpose, has since been dissolved. The possibility of using straw has been considered, but owing to the high cost of collection and transport, compared with the cost of molasses, nothing concrete has so far developed. The situation may be different now, however, if the increased cost of molasses is taken into consideration.

Acceptability as a Food

In Malaya the addition of the Jamaican food yeast to soups, stews, gravies, etc., has proved widely successful in community feeding centres and canteens, and it seems unlikely that there is going to be any difficulty in getting people to buy it when it becomes available. Although the flavour of the food yeast when taken alone is generally described as meaty, there is no doubt that when incorporated in cheese, rissoles, milk puddings, pastry, flour, and bread, the flavour of the final product is unaffected. For instance, in flour for bread-making, food yeast has been added to the usual amount of yeast employed. When up to 5 per cent. food yeast was added to wholemeal loaves and about 2 per cent. to white loaves no change in flavour was noted.[2]

It has been suggested that the addition of food yeast to bread could solve the problem of putting back some of the values which are removed in milling white flour.[3] On the other hand, it is quite reasonably pointed out that if the food yeast were fed to the hens instead of the offals removed from the wheat, and we were left with our high extraction loaf, the roundabout process of additional milling and enrichment could be dispensed with.

The recommended supplement of food yeast to be taken daily varies from 3 to 14 g.,[2] according to the type of consumer, but even at a cost of 1s. a lb. this works out at little more than ¼d. a day, a sum well within the means of the poorest.

Doses over the specified amount should not cause digestive disturbances; it has been claimed that one person ate 64 g. for four days without ill-effects.

Food values of dried yeast per 100 g. are estimated[2] at 43 g. of protein, a value approaching that of milk, 2 mg. vitamin B_1, 5 mg. riboflavin, and 40 to 45 mg. nicotinic acid. Pyridoxine (vitamin B_6) content has been estimated at 4 to 8 mg. per 100 g. of dried food yeast, a figure superior to any other source of pyridoxine so far examined.

Beef or mutton proteins have been estimated[4] to be 5 times as dear as food yeast protein, milk protein 8 times, and egg protein 24 times as dear. The B vitamins of beef, mutton, or milk are 25 times

as dear, and eggs 80 times dearer than those of food yeast.

The nutritional value of the food yeast is therefore obvious, and as the price is far from exorbitant and a willing market is assured it is to be hoped that this first full-scale industrial application of the food yeast process may be the beginning of an attempt to fill the needs of the malnourished communities in a practical way.

Food Yeast Growth Rate

An ox weighing half a ton will in 24 hours put on some 2 lb. of meat, of which less than 1 lb. is protein. Half a ton of yeast, in favourable conditions, would theoretically produce in the same time some 1,200 lb. of protein.

With a few comparisons of this kind the nutritional potentialities of food yeast were recently underscored by Dr. A. C. Thaysen.*

No higher form of living organism, either plant or animal, can approach the phenomenal rate of reproduction and rate of protein synthesis achieved by yeasts. Moreover, it is significant that yeasts build up their protein from inorganic sources of nitrogen.

In the ordinary method of yeast manufacture nothing like full advantage is taken of the maximum rate of reproduction. The increase in 9 hours amounts to a threefold or fourfold gain in weight; theoretically it should be about sixty-fourfold.

The age of the individual cell in conditions of slow growth must vary to a much greater extent than when growth is rapid, with the corollary that cell content and cell structure are similarly more variable. This consideration is important in the manufacture of food yeast if the product is to be standardised in protein, mineral salts, and vitamin content. In the course of studies to determine whether this optimal rate of growth and more uniform composition could be secured in practice, the starting point was Buchanan's (1928) formulae for the four stages of the growth rate of microbial cultures, of which three were relevant to the discussion: the initial growth accelerating stage, the logarithmic rate period, and the stage of negative growth acceleration.

The conclusion was that if the aim was to speed up the growth of the food yeast organisms it would be desirable to encourage the logarithmic phase of growth throughout the whole fermentation. Although it could not be claimed that the shortest generation time of 87 minutes, reached during the logarithmic phase, could be maintained over prolonged periods, it was found possible to secure a stabilised growth rate of 100 to 120 minutes.

* In an address to the Nutrition Society at Aberdeen on October 19.

Doubling the Output

The output of yeast from a given plant, therefore, can be double that obtainable by using the standard method of procedure. Moreover, the faster growth lends itself to a continuous method of production. This can be maintained for weeks by simply withdrawing fermented wort, containing 2 to 2·5 per cent. of dry yeast, from the bottom of the vats, and replacing it at the top with an equal volume of fresh wort in which the necessary food substances—sugar, nitrogen, and phosphorus—are dissolved. The longest period during which continuous production has been maintained is 20 days, but this may not necessarily represent the maximum.

No doubt because the reaction of the wort is kept at a *p*H of 3·2 to 3·5, there is little or no danger of infection with bacteria or unwanted yeasts, even with fermenters open and in a tropical climate.

A vital factor in maintaining growth is an adequate air supply—140 cu. ft. per minute per 2,000 gal. of fermenting liquor contained in vessels not more than 25 ft. in height, provided the air be dispersed into the liquid through ceramic blocks with apertures not exceeding 12μ.

The yield of dry yeast obtained amounts to almost 60 per cent. calculated on the sugar used. In order to detect any slowing up in rate of growth an hourly check is made by counting the number of yeast cells in 1 ml. of wort. As a check on contamination with micro-organisms, stained preparations of the wort are made at intervals.

Carbohydrates used in Production

The type of carbohydrates used in large-scale production of food yeast has usually been the mixture of saccharose and invert sugar contained in sugar cane or beet molasses. There is no reason, however, why other hexoses, or even pentoses, such as xylose, should not be used. The recent rise in the cost of molasses, in fact, makes it possible that other sources may become competitive. Perfectly good food yeast has been prepared from waste potatoes, bananas and other fruits, carob beans, straw, and even sulphite lyes, although in the case of this last the rate of growth of the yeast is slow. It should be remembered, also, that the use of starch makes necessary a preliminary hydrolysis of the polysaccharide into glucose, a process which adds to the cost of production.

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3. *British Medical Journal*, 1946, No. 4455, p. 804.
4. Thaysen, *Nature*, 1943, **151**, p. 406.

Public Health during the War

IN 1936 the present Director-General of the Food and Agriculture Organisation, Sir John Orr, published his *Food, Health, and Income*, which showed that something like half the population of Great Britain did not earn enough money to permit them to purchase a minimum diet.

When money is short and food is expensive there is a tendency to purchase only high energy foods such as bread, jam, margarine, and sugar. Pre-war foods of this type were low, or completely deficient, in vitamins and minerals. Protective foods, although pleasant to the palate, are usually low in calories, and if the family income is low either they are not bought at all or only purchased in inadequate amounts. Orr showed that malnutrition was widespread in Great Britain before the war due mainly to this simple economic fact.

Within a relatively short time after the onset of the war enlightened Government policy completely altered this state of affairs. By a series of subsidies the retail prices of basic foodstuffs were kept at a level at which practically everybody, particularly with their increased war-time earnings, was able to purchase all they needed of these foods.

Improvement in Quality

In addition, the quality of many of these foods was improved. Vitamins A and D were added to margarine, and an 85 per cent. instead of a 75 per cent. extraction flour was produced from the wheat; this latter ensured a higher vitamin B content in the bread. However, this was obtained at the expense of the dairy herds, since 85 per cent. extraction meant so much less wheat offal for use as feeding stuffs. It is questionable whether much better results may not have been obtained had 75 per cent. flour been continued and been fortified with synthetic vitamins. The resultant supplies of feeding stuffs would have prevented reduction of the dairy herds, and the community would have gained by the additional milk.

The introduction of an equitable rationing system and the placing of unrationed foods on points, helped to secure a fair distribution of the available food. Special priorities for children in milk, provision of cod liver oil and bottled orange juice for babies and young children took care of the child population. British restaurants, factory canteens, and school meals all gave extra food off the ration.

The cultivation of allotments increased enormously the consumption of fresh green vegetables and potatoes, and the Ministry of Food carried out intensive propaganda to help people choose the right foods and tell them how to make the best use of the available foods. As a result of these measures most of the people of Britain fed (nutritionally speaking) as they had never fed before.

Nutritional Experiment

The measures taken by the Ministry of Food were really the putting into effect of the great mass of nutritional theory which had accumulated in the twenty years or so before the outbreak of war. The Ministry in fact conducted a gigantic nutritional experiment on the people of Britain—an experiment with nine chances in ten of "coming off," and to which there was, in any case, no alternative.

All the accumulated evidence from the nutritional work of the past twenty years goes to show that the incidence of disease and death is less in those communities which have a high nutritional state than in those which have a low one. That being so we should expect to find the answer to the Ministry of Food's experiment with forty odd million people in the report* of the Chief Medical Officer for the Ministry of Health for the years 1939-1945.

Vital Statistics

The birth rate increased progressively from 1941, reaching in 1944 a figure of 17·7, which is the highest it has been since 1926. Most age groups, despite war casualties, showed a steady decrease in the overall death rate—this was particularly noticeable in the case of young children of the age groups 1 to 5, 5 to 9, 10 to 14.

It is generally agreed that neo-natal and infantile death rates are a good index of the nutritional state of the community. Australia and New Zealand have a much higher nutritional level than Great Britain. The England and Wales figure for neo-natal deaths for 1938 was 28·30 per thousand, and in New Zealand in 1937 it was 19·41.

We should expect, therefore, if the nutritional state of Britain has gone up during the war, that there should be a progressive reduction in the neo-natal death rates. This we find to be a fact—the neo-natal rate fell from 28·30 in 1938 to 24·35 in 1944. Similarly the deaths from all causes of infants under one year fell from 50·6 per thousand in 1939 to 45·4 in 1944, there being a striking reduction in death from premature birth (14·9 to 11·8 per thousand). Another improvement was in the

* *On the State of the Public Health during Six Years of War.* Report of the Chief Medical Officer of the Ministry of Health, 1939-1945. Pp. 280. H.M.S.O. 5s. 6d. net.

rate for deaths of mothers due to pregnancy and child-bearing. There was a drop from 2·70 maternal deaths for every 1,000 births in 1938 to 1·52 in 1944, a drop of 1·18. Compare this with the much slower fall in the preceding years—3·43 in 1931 to 2·79 in 1937, a fall of 0·64, only about half the rate of improvement effected during the war years. Deaths from puerperal and post-abortive sepsis fell from 0·016 per thousand to 0·012 from 1939-1944.

Infectious Diseases

There was also a decrease in deaths from a number of infectious diseases, and in some it would be rather stretching a point to attribute this improvement to improved nutrition. One might, however, quote the fall in the death rate from influenza from 0·194 in 1939 to 0·103 in 1944 as a disease mortality which probably was affected, at least in part, by improved nutrition.

Some of the large towns showed a striking reduction in infantile mortality during the war. Liverpool 74 to 58, Manchester 69 to 54, Newcastle-on-Tyne 66 to 51, Birmingham 61 to 42, Greater London 50 to 43, Sheffield 50 to 42, and Bristol 42 to 35. Overcrowding of air-raid shelters and migration of populations from bombed and threatened areas set the stage for a major epidemic—which did not develop. In fact, under ordinary circumstances, one would have expected a general increase in all forms of mortality; that the national health actually improved during the war years is a striking testimony to the Ministry of Food's nutritional experiment.

Fortification of Foods

The report of the Chief Medical Officer not only supplies these and other illuminating figures, but it discusses also many phases of the Ministry of Health's activities, for example the Emergency Public Health Laboratory Service and other subjects. The section on nutrition gives details of the rationing system, notes are provided concerning the food supplied to British Restaurants and canteens, school meals, and special foods. Regarding the fortification of foods with vitamins the report states that margarine was fortified in January, 1940, by the addition of vitamins A and D, vitamin A by 550 I.U. per ounce and vitamin D by 30 I.U. per ounce, raised to 60 in 1941 and to 90 in January, 1945, which made margarine approximately the same value as English (summer) butter. Calcium was added to the National flour at the rate of 1·6 parts per thousand in 1941, and vitamin D was added to National dried milk in 1945 at the rate of 800 I.U. per pint of reconstituted milk. These additions were not made because of any discovered deficiency in the diet as a whole, but in order to reduce the risk of too small an intake of these particular nutrients in any class of the community.

During the course of the "great experiment," the Ministries of Food and Health carried out dietary and nutritional surveys to find out how things were going. It would have been interesting to have received more detailed information of the results—but the report does devote some three pages to the subject.

Notes are also given on milk and meat and the control of quality of foods, and the work of the Ministry's Health Laboratory.

The report provides interesting reading and even more interesting study, but the most important lesson which it drives home is the extent to which the health of the community benefits from improved nutrition.

Concentrated Butter

A METHOD of making concentrated, hardened butter with a melting point of 105° F. in the normal product has been developed by the Council for Scientific and Industrial Research in Australia. The product is similar to ghee, the Indian butter which is specially treated to give it good keeping qualities in the tropics, in that it contains no water and is not therefore subject to bacterial action. The flavour of the new type of concentrated butter is claimed to be similar to that of pure butter.

Pure dry butterfat is the basis of the butter, and the method of preparing it has been described in *Rhodesian Mines and Industries* (1946, **7**, 4, p. 7). The butter is melted at a temperature below 100° C., and water is removed by centrifugal force and then by boiling in a vacuum. About 3 per cent. of an edible fat with a high melting point (*e.g.* hydrogenated groundnut oil) and a small quantity of salt and skim milk powder are then added to the butterfat. The last two replace the salt and milk solids which were removed when the water was extracted. The melted mixture is passed through a vacuum (air is removed to eliminate oxidation), is cooled by a special type of cooler until it becomes solid, and is then canned, again in a vacuum. The method of cooling is important as it determines the texture of the product, which is claimed to be similar to that of ordinary butter. Hard fat must be made to crystallise from the melted mixture in the form of minute, interlocking crystals which absorb the liquid portion of the fat.

When water is re-incorporated into the butter by beating it is claimed that the product is practically indistinguishable from ordinary butter.

Food Composition Tabulated

THE nutritional and dietetic treatment of disease, as well as research into problems of human nutrition, demands an exact knowledge of the chemical composition of food. The recent war, with its attendant nutritional problems, created a demand for analytical data on this subject, old and new, and the result is seen in the publication of a second edition of McCance and Widdowson's tables.* This collection of valuable data has been revised in the light of recent experience and previous criticisms, so that a number of minor alterations appear, together with additional data and figures for a number of new foods and food materials which are characteristic of the war and post-war period.

The foods have been analysed not only in the raw state but also as prepared for the table, and studies have been made as to the losses introduced by cooking. The authors have previously examined the question whether all the constituents of the food are really available for the body's use; whether they are decomposed in the alimentary canal, or fail to be absorbed. The greater part of this work was published by the Medical Research Council in H.M.S.O. Reports (Nos. 135, 187, and 213). Since these reports contain much data which has not been reprinted in the present volume those interested in the subject should not fail to consult them.

This more recent summary of the valuable data collected by McCance and Widdowson is arranged into groups which follow a practical rather than scientific classification as follows: cereals and cereal foods; dairy products; meat, poultry, and game; fish; fruit; nuts; vegetables; sugar, preserves, and sweetmeats; beverages; beers; condiments; vegetable fats; cakes and pastries; puddings; meat and fish dishes; egg and cheese dishes; sauces and soups; vegetable dishes. Among the beverages may be noted Bovril, Marmite, Oxo, and Virol; the vegetables include tomatoes; the fruit group, rhubarb; while with the cereals are classed the starchy foods such as arrowroot, sago, tapioca, and soya products. The practical rather than scientific classification might possibly have led to difficulty in locating specific data, but the authors, recognising this possible result of the necessarily arbitrary method of classification, have guarded against this by the excellence of the index.

The composition of the various foods is given in both percentage and per ounce and only the edible portion of each food has been analysed. In this edition carbohydrates are expressed throughout in terms of monosaccharides for the sake of consistency, so that in the calculation of diets the sum of the daily or weekly nutrients is multiplied by 3·75 instead of the figure 4·1 given in the previous edition. In some tables the factors for the conversion of protein, fats, and carbohydrate figures to calories are somewhat different from the ones usually employed, since the authors have made allowances for the loss of calorific material in the faeces. This is not consistent with the procedure adopted for other food constituents, and the authors state their preference for the more usually employed figures of Rubner of 4·1 and 9·3 for protein and fat and 3·75 for carbohydrate expressed as monosaccharide.

The phytic acid phosphorus, important since phytic acid forms insoluble calcium and magnesium salts which may be precipitated in the stomach or duodenum, thus preventing the absorption and utilisation of the greater part of the calcium in the food, is given for a number of foods in a separate table.

Some useful notes on technique are included and special mention made of certain individual findings. With malted foods and cereals the Soxhlet method of fat estimation gives lower results than von Lieberman's method, but the reverse is true with condiments. Some twelve pages of war-time recipes advocated by the Ministry of Food are given with reference numbers, so that reference to a particular recipe can be made more readily in the tables. These are followed by the bulk of the book, some 122 pages of tables of composition, a page of references, and, finally, the index.

There is an enormous wealth of data in this book, whose modest size gives but little idea of the very great amount of exacting work that must have been carried out to assemble the material it contains.

All dietitians and workers interested in nutrition will undoubtedly find it indispensable, and the majority of food technologists and chemists in the food industry will find it a most valuable work of reference to have on their library shelves.—J. A. R.

* *Chemical Composition of Foods.* By R. A. McCance and E. M. Widdowson. 2nd Edition. Pp. 156. London. 6s. net.

Trade in South Africa

OUR cupboards depend upon the export of home-manufactured goods balancing the necessary imports from abroad. Encyclopedic in trading information is a manual* on marketing and advertising in South Africa containing much which should be known to enable the business man to approach the subject of selling and buying, advertising, marketing, and the psychology of the

* *Marketing and Advertising in Southern Africa.* Edited by John Barnard, F.S.C.C.(London), A.A.C.S. (S.A.) Pp. 112. Johannesburg.

different sections of the mixed population in that country.

Information about the native Afrikaans, English, Asiatic, and the other groups that make up the African nation is presented in the sort of detail that should be invaluable to commercial and industrial interests.

It is well known that the Americans are surveying keenly the African scene, and that competition with their enormous resources will be a trial and a challenge to all that is best in our country.

South Africa imports a yearly average of food, drink, and tobacco up to a value of £5,600,000, and manufactured articles up to nearly £71,500,000, other raw materials, etc., amount to £13,000,000. It exports about £31,000,000 worth of animals, products of the soil, and produce from the mines. The potential is more promising even than the actual, and the post-war years should see an increase that will raise the demand for all ordinary manufactured goods to an enormous extent. Trade is reciprocal in its benefits, and Britain and South Africa can attain mutual prosperity by serving each other's requirements.

An intimate knowledge of existing conditions, and what they mean in terms of applicable commodities suitable for specified areas, is revealed in the book.

A knowledge of weather, general conditions, and physical characteristics is essential before markets can be approached. Furthermore, details of administration must be understood. The municipalities in Africa are large purchasers of articles ranging from ordinary domestic appliances to trolley buses. Johannesburg alone values its annual purchases at over £1,000,000.

The English-medium papers are very influential in the large urban areas, the Africaans press being more prominent in the rural areas. Both mediums are important and complementary to each other in all forms of publicity intended to capture the South African markets. About eighteen journals cater for the six million natives, mostly illiterate; and there are several monthly and weekly periodicals to serve the 90,000 Jews.

Among interesting facts about trading, attention is drawn to the prevalence of cash-basis bazaars. Evidently the people of South Africa live up to their incomes, and do not regard saving as a virtue. What is paid out in wages, therefore, goes into immediate circulation. Bazaars are a popular means of disposing of all surplus cash, and the managers of such places are always requiring good selling lines. It is definitely a market that should appeal to our own manufacturers.

Interest in marketing and advertising in South Africa is maintained throughout, and the editor is to be congratulated upon his achievement.—A. J.

The Milling Industry

(*Continued from page* 18)

necessity of including in the blend a high proportion of English wheat, which owing to its nature could not be washed.

The cumulative effect of these various factors makes present-day flour considerably more liable to become infected with mites during storage than was pre-war flour, and it is to be regretted that some authorities should have seen fit to take legal action with respect to a defect which was the outcome of officially imposed conditions.

It is claimed that the Entoleter, a machine which was described in last year's review, will deal effectively with mites and their eggs in addition to killing insects and larvae. This machine may prove a great boon to the manufacturer or packer of cereal goods, but at the moment the supply position, as with most plant, is difficult.

Pest Control in Mills

Various forms of insect life are brought into a mill with the wheat, and the flour dust which lodges in crevices and builds up in fairly inaccessible portions of the plant provides excellent sites for their development and multiplication. Such infestation does not lead to contamination of the finished flour, since the final flour dresser removes insects, larvae, and eggs, although it does not remove the minute eggs of mites, but in order that the infestation of the premises and plant shall be kept in check the mill has to be fumigated periodically.

During 1946, attention was given to the possibility of using D.D.T.-containing paints and varnishes in a mill with the object of restricting the development of those forms of insect life which could not be prevented from gaining access to the premises. In one experiment one-half of an elevator band was treated with D.D.T., while the other half was left untouched. When the elevator was examined nine months later, the untreated half of the band was carrying a considerable amount of "webbing" and was contaminated with insect life, whereas the other half was clean and showed no evidence of contamination with insect life.

The use of such insecticidal paints would not lead to complete sterility in the mill, since the D.D.T. paint would not reach every crack and crevice and certain non-toxic surfaces would still be available as breeding grounds. Treatment of the premises and portions of the plant with these modern insecticides of marked potency and persistence of toxicity should, however, keep the degree of infestation at a low level for a long period, and the results of further experiments are awaited with interest.

The Grower and the Canner

THE growing of crops specifically for the use of the canning industry was the subject of a recent talk to growers on the island of Jersey by Mr. S. W. Smedley, chairman of the National Canning Co., Ltd., and of the local Jersey Canners, Ltd., in which the former company now has a controlling interest.

Mr. Smedley suggested that such crops as peas, beans, carrots, spinach, beet, and soft fruits could be grown on Jersey for processing at the local factory, and offered to enter into long-term contracts at fixed prices with the growers. For instance, he would require at least 60 acres of peas grown on the island next year in order to justify the expense of installing the machinery to deal with them.

Two bushels of seed per acre would produce 2 tons of shelled peas, for which he would pay £30 per ton, or £60 per acre. The crop would be cut when ripe with a mowing machine and all cleaning and shelling would be done at the factory. Seed would be supplied to the grower at cost price, which could be deducted from his first sales, if desired.

It was essential that the local factory should be kept employed all the year round, and therefore it was to the growers' interest to see that they grew crops which would be available before and after the usual potatoes and tomatoes now raised on the island.

As an example, Mr. Smedley pointed out that if peas were planted now they would be fit to harvest in May, thus leaving time to follow on with outdoor tomatoes.

As the Jersey grower will not yet be allowed to ship his 1947 crop of potatoes to the English markets, there was a chance for growers to give their land a change and sell all it produced locally. On the other hand, Jersey Canners, Ltd., would be prepared to take all the potatoes of suitable size which they could obtain and would pay a commensurate price to the grower for digging these while small.

During the recent season over 100 tons of Jersey new potatoes had been canned on the island, but in 1947 it was hoped to handle many times that quantity. Tomatoes, too, would be required, and although in 1946, since he had become interested in the factory, they had canned over 1,000 tons, he expected next year to reach five or six times that output.

In addition, the National Canning Co., Ltd., had bought many thousands of tons of Jersey tomatoes on arrival on the English market and the whole of this output of cans had been absorbed by the London market and was on sale to the public from December 10.

This policy of the manufacturer going direct to the grower is to be commended as it should serve to create a feeling of co-operation to their mutual benefit. The grower who is producing fruit for a canning factory can sell to the latter a considerable portion of his crop, which, though of first-class quality, may be unfit to withstand transport to the nearest market for reasons of over-ripeness, malformation, or other causes.

If the grower confines his business dealings with the factory to throw-outs, smalls, or to those of inferior grades only, he must expect to get inferior prices. But if he is sending his whole output over the season to be processed he will receive a higher flat rate for his crop, which will show an average that compares favourably with his sales of first grade on the market and the loss sustained by the residue which has not been fit for disposal.

Jersey growers have been given much to think over in Mr. Smedley's proposal, and they are to formulate parochial committees to ascertain the possible acreage available to try out experimental sowings. If these are successful there is a possibility that the canning of local produce may revolutionise, even if it does not supplant, the present system of relying entirely on the two main crops of potatoes and tomatoes.

Freezing of Canned Meat Products

FOLLOWING work by Smith and Smith on the effect of freezing on a variety of canned foods, Gardner has made a further investigation with special reference to canned meat products.

Sound cans of the products concerned were frozen at −30° F. for 24 hr. and thawed for 24 hr. at room temperature, the cycle being carried out three times. The cans were then opened and compared with controls. Even with this severe treatment packs of meat without cereals were little affected; Vienna sausage was actually improved in texture. With products containing starchy material (*e.g.* meat and spaghetti, meat and vegetable ration, and corned beef hash), on the other hand, there was some deterioration in texture and sometimes flavour; the products were still edible, however. Similar results were obtained in a series of experiments designed to simulate alternate freezing and thawing of a type to be expected during transport in the winter. In none of the experiments were the cans themselves damaged by freezing and thawing. These results are similar to those of Smith and Smith.

Statistics of Advertising

DIGEST OF FINDINGS

There has been published a Report upon the investigation carried out by the National Institute of Economic and Social Research, on the initiative and with the aid of the Advertising Association.

The ultimate object of the enquiry is to examine the effects of advertising, or of particular methods of advertising, on social welfare in all its aspects. The sole guiding principle is the public interest. It was decided to concentrate upon the statistical investigation, the results of which would provide an indispensable basis for continuing research and possibly for the establishment of some central statistical system.

The Report now issued establishes the facts about:

(i) the total expenditure on advertising in this country;
(ii) the sub-division of this expenditure according to commodities or services advertised;
(iii) the sub-division according to media;
(iv) the sub-division according to the sections of the advertising industry.

The total expenditure on advertising is analysed in the Report, and it is pointed out that an estimate for total advertising expenditure in the United States in 1935 corresponded to 3 per cent. of the net national income, compared with 2·2 per cent. in the United Kingdom in the same year.

With the help of information obtained from special questionnaires sent to selected advertisers, total advertising expenditure has been analysed between nineteen main groups of goods and services.

Special interest was attached to the proportion which manufacturers' advertising to the final consumer bore to the value of manufacturers' sales destined for the final consumer. In the case of tinned foods, the expenditure represented less than 8 per cent. of their manufacturers' sales.

The Report stresses the almost complete absence of any official information in regard to advertising expenditure, notwithstanding the important influence of advertising upon the working of the country's economic system. On the other hand, it is stated that much information was obtained by means of private enquiries, thanks to the co-operation of numerous businesses.

The official sources of statistics could be improved, the Report states, but will always be subject to considerable limitations.

Official statistics, however, cannot provide all the information required on such a complex subject as advertising. Official censuses have to provide the background of facts to serve many purposes at the same time, and the degree of detail obtainable on any one topic is necessarily limited. There is the risk of firms refusing to answer official questions, thus discrediting the whole census.

To sum up, the advantages to the advertising trades of a regular statistical system based mainly on internal sources would be (*a*) to give firms a picture of how their own operating ratios compare with the average and with those firms not necessarily in the same trade; (*b*) to provide "sellers" of advertising with a continuous record of movements in the advertising market; (*c*) to furnish valuable pointers for the purpose of forecasting economic and market trends.

Two-thirds of the Report consists of Appendices which provide a great fund of detailed information concerning the Circulation and Revenue of Press; the Expenditure on Outdoor, Radio, Film, Direct Mail and other forms of Advertising; an Enquiry into Advertising Budgets (in conjunction with the Incorporated Society of British Advertisers and the Advertising Association); and finally a more elaborate analysis of the distribution of expenditure on Press, Outdoor, and other forms of advertising between 200 or more categories of commodities.

A definitive edition of the Report is to be published by the Cambridge University Press. The statistical section is now in practically final form, and will be given a somewhat fuller interpretation in Part I.

Packaging Advice

Even before the war the idea that a pack was solely a method of protecting contents in the journey from factory to consumer was nearly out of date. The idea that the package should convey to the public the character of the product within was the next stage, says Mr. John M. Ryan in an article on "Packaging" contained in a survey of design at the "Britain Can Make It" Exhibition recently published by H.M. Stationery Office.

A later development was attention to consumer convenience. By using containers which were more handy in use, easier to open and reseal, or which could be used for other purposes, enabled many firms to win added goodwill.

Mr. Ryan urges firms to take their packaging as seriously as their production, sales, and administrative problems. To underrate the power of first-class packaging is like driving a car with the brake on. He suggests that the time is ripe for a fresh start in methods unfettered by tradition. While goods are still in short supply, the risks of trying out new designs are negligible. Time is short, because when competitive conditions return it will be too late to experiment. Above all, manufacturers should develop a perspective in regard to the costs of designing efficient and effective packages.

It is no good devoting large sums for sales and advertising campaigns and thinking in pennies when it comes to presenting a product to the public. The product is the final point of sale between maker and public, and in the race for favour it is as well to remember that the package is the last hundred yards in which it is lost or won.

"And I tell you that's my FISH!" *Courtesy "Meat Trades' Journal."*

New Food Factory

A new factory which will employ nearly 600 people is to be established in Dundee by James Keiller and Sons, Ltd.

It was indicated by the chairman of the factory, Sir Sydney Parkes, that the first half of the premises will be reserved for jam and marmalade production. The other half, which may not be ready until next March, will be used to manufacture Tobler chocolate, the Tobler factory in London being destroyed during the war.

Change of Address

Technical Products, Ltd., have moved to more extensive premises at 112, Strand, London, W.C. 2. Tel: TEMple Bar 4455. An office has also been opened at 4, St. Mary's Parsonage, Manchester, 3. Tel: Blackfriars 0097.

*

The Standards Department of the Board of Trade has left Boots Hotel, North Promenade, Blackpool, and the address is now Chapter Street House, Chapter Street, London, S.W. 1. Telephone: Victoria 7032.

Constructional Material

Made in the form of sheets, tubes, rods, angles, and channels with either a paper, fabric, or asbestos base, Tufnol is a non-metallic constructional material resembling hardwood or horn in appearance. A recently published catalogue contains information regarding all the products of Tufnol, Ltd., including the basic shapes, gears, bearings, electrical insulators, varnish, and cement.

Herring Gutting Machine

A machine capable of gutting over 120 herrings a minute was recently demonstrated to members of the Herring Industry Board. Still in the experimental stage, the machine is designed to prepare fish for the curing trade in contradistinction to earlier gutting machines for use in canning. These earlier machines are known as "nobbing" machines and have been in use in England since 1939.

Herrings are fed on an endless belt to containers and passed to the automatic gutting mechanism. The machine was invented by Mr. Paul Danielsson of the Stockholm firm of Arenco, Ltd., who are responsible for its production.

British Valve Manufacturers

At the seventh annual general meeting of the British Valve Manufacturers' Association held on November 20, Mr. J. M. Storey, managing director of Dewrance and Co., Ltd., was elected chairman for the ensuing year, in succession to Mr. Robert A. Blakeborough, chairman and managing director of J. Blakeborough and Sons, Ltd.

Industrial Law

Important changes in Industrial Law have taken place recently as a result of such measures as the Industrial Injuries Act (which supersedes the Workmen's Compensation Acts), the National Insurance Act, and the revocation of the Essential Work Order.

This fact gives special interest to the Industrial Welfare Society's postal course in Industrial Law which has now been successfully conducted for some years. The course consists of six lectures, which are constantly reviewed so as to be up-to-date, and covers the whole field of employment and factory law with which management and executives in industry are concerned.

Whalemeat, made into "whaleburger" steak, being prepared for luncheon.

Food Education Society

At a lecture given by Sir Jack Drummond, D.Sc., F.R.I.C., F.R.S., under the auspices of the Food Education Society on the "Scientific Approach to Food Problems during the War," he traced the course of measures taken in providing the population with adequate food. The rationing during the 1914-1918 war was child's play compared with that of the late war, and the increase of knowledge of foodstuffs and health gained between the wars was remarkable and so comprehensive that in 1939 it was possible to make plans for the feeding of the people during the war.

Professor Drummond reviewed the approach to the problems of deficiency of calcium, vitamin B_1, and vitamin A, and said that rationing was evolved not only on nutritional but on physiological grounds.

Apart from the large amount of research carried out by Government Stations, research associations, and private firms, the Ministry of Food made its own research into some special problems and a survey was set up on similar lines to that used before the war by Sir John Boyd Orr.

The Ministry of Health took its part in setting up a clinical survey and examined groups of workers for any signs of malnutrition, and co-operation between the Ministries of Health and Education led to weight surveys on school children.

The price of food was important to the Ministry of Food, and the subsidies of essential foodstuffs were based on their nutritional values. Professor Drummond showed some slides giving figures and graphs of various food positions during the war.

On the question of bread, the speaker stated that the 85 per cent. extraction was found to be the most satisfactory after considerable research carried out by the Research Station at St. Albans, but the psychological aspect had caused a certain amount of controversy. He paid tribute to the fine co-operation between Cambridge scientists and those in the U.S.A. in the matter of dried foods.

Irish Food Patents

Complete specifications have been lodged in the Eire Patent Office for the manufacture of bread or confectionery of enhanced keeping quality and also a process for the manufacture of table jelly or marmalade from edible seaweed. The specification for bread states that a small quantity of mineral, vegetable, or animal wax is distributed evenly throughout the flour or dough. The wax may be mixed under heat with pharmaceutical paraffin oil, animal or vegetable oils, fats, glycerin, or lecithin. The distributing agent is prepared by mixing the wax or wax-oil-fat composition with a small quantity of flour at a temperature below the boiling point of water, cooling the product, and reducing it to powder.

An example given specifies the following ingredients for the treatment of 10,000 parts of flour: paraffin or vegetable oil, 28 parts; paraffin wax, 56 parts; margarine, 2 parts; and bread flour, 268 parts.

In respect of the process for the manufacture of table jelly or marmalade it is described as treating the dried and washed seaweed with a citrus fruit, allowing the ingredients to interact for a period of from 24 to 100 hours until the seaweed has been converted into a semi-gelatinous form. The mixture is boiled with sufficient water to prevent burning until a jelly is formed, when sugar is added. Additional pulped and sweetened citrus fruit may be added to the jelly product.

Institution of Factory Managers

The following meetings of the Institution of Factory Managers will be held at the Bonnington Hotel, Southampton Row, London, W.C. 2:

January 15. 6.45 p.m. S.E. London Branch Meeting. "Personnel Management—A Survey." G. R. Moxom.

January 25. 10.30 a.m. Council Meeting.

The Annual General Meeting will be held at 2.30 p.m. on January 25 at the Waldorf Hotel, Aldwych, London, W.C. 2.

Herring Butter

From Yarmouth is announced the establishment of a new factory for the manufacture of herring butter which is already giving permanent employment to nearly 100 Yarmouth men and women.

The herring are soaked in tanks and are then headed, slit, and gutted by machine, the roes are removed, and the various items sorted into containers. The fish is then minced in large size mincers into which four differently treated types of herring are fed in definite proportions. The minced fish is then fed into bowl cutters, which both convert the fish pulp into a paste and mix other ingredients. The whole is then churned into a smooth paste of reddish brown colour.

The butter is packed into 10 lb. tins, and its flavour is faintly reminiscent of anchovy.

Paris International Trade Fair

FOIRE DE PARIS OF 1947

The *Foire de Paris* of 1947 is expected to add further to its success of 1946 when it opens on May 10, 1947, continuing until May 26.

Owing to the inadequacy of the 131,000 sq. yds. of hall space available in 1946, an additional 36,000 sq. yds. are being made available for 1947, which includes 5,000 sq. yds. for the food section.

Exhibitors represent every single country in Europe; in fact, no less than thirty-nine different nations have, at one time or another, taken part in the *Foire de Paris*.

It is stated that the Technical Section of the Fair which, in 1946, surpassed the corresponding Section of the Leipzig Fair in 1939, will constitute the most important industrial exhibition throughout the world.

Fan Equipment

Among the many essential installations necessary for the hygienic production of foodstuffs is fan engineering and air conditioning equipment. Such equipment or advice on its installation may be obtained from the Fan Manufacturers' Association, Ltd., one of whose principal aims is the spreading of knowledge on fan technology.

Membership of this Association is confined to the leading manufacturers and pioneers of the industry, who have extensive plant and unrivalled facilities for the economical production of fans of all types and sizes.

Telephone Intercommunication

Named the Standard Staff Locator, Standard Telephones and Cables, Ltd., have announced in a recent booklet their system of office intercommunication. On the instrument are twenty-eight colour combinations which allow the same number of individuals to be paged. The instrument works on the system of light combinations, and although control can be exercised from any desired point, it is usually more convenient for the control unit to be located at the telephone exchange. The system operates from the electric mains and there are no loud speakers or noise.

Celebration Dinner

Celebrating sixty years of continuous service with the firm, Mr. W. B. Kelly and his daughter, Mrs. Murray, were entertained to dinner on October 18, by the directors of W. J. Bush and Co., Ltd.

Motor Control Gear Prices

Owing to the continued advances in labour and material costs Watford Electric and Manufacturing Co., Ltd., have increased their catalogue prices from November 11, 1946, by 70 per cent. instead of 60 per cent.

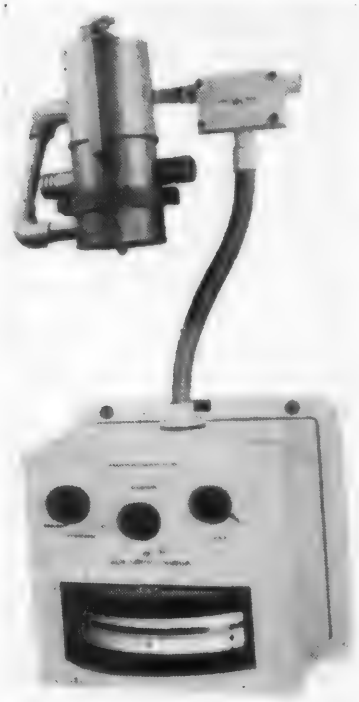
Detergent Strength Meter

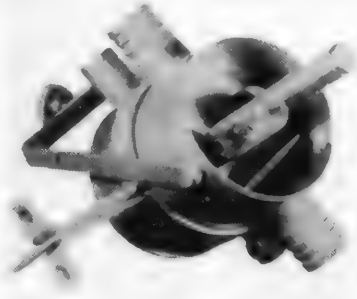
The need for a meter visually indicating detergent strengths has been apparent for many years in the bottling trade. Such an instrument is more valuable as a scientific control today when so many units are still operating with unskilled or semi-skilled labour. There is a definite trend towards the elimination of the human factor and its replacement by instruments for bottle washing machines, the development of which is directed towards a higher, more accurate, and more efficient standard of cleanliness and sterility in any receptacle containing perishable food.

The field covered by the detergent strength meter embraces the whole of the bottling industry—milk, beer, mineral water, wine, etc.—and a new development is the production of a modified meter for use on automatic dish washing machines, which will render more efficient the washing of plates, cups, and cutlery in industrial canteens and elsewhere.

The instrument can be used for any make of detergent, whether proprietary or plain caustic soda, soda ash, etc. The bottling operative is enabled to exercise a constant check on the condition of the detergent tanks, and this, combined with the grouped instrument board on modern machines showing running temperatures, completes the control so far as it is at present mechanically possible.

The British Hydrological Corporation have been appointed sole distributors of the meter, which is manufactured by Industrial and Scientific Instruments, Ltd.





Left: Detergent strength meter and flow type electrode assembly showing junction box allowing all connexions to be made without breaking instrument sealing, the leads to the electrode running through the conduit.
Below: The assembly with sump removed showing glass conductivity cell and automatic temperature compensator.

Where to Buy Chemicals

The autumn 1946 edition of *Where to Buy*, a useful directory of suppliers of chemicals and plant, has recently been published. It is divided into three sections: (1) Dealing with heavy and fine chemicals; (2) Plant, material, and apparatus; and (3) List of trade names. The book is easy to refer to, the names of the items being in large heavy type and arranged alphabetically.

Polish Engineers' Congress

Mr. Norman Neville, O.B.E., Director of the Food Machinery Industrial and Export Group and the British Chemical Plant Manufacturers' Association, represented the British Engineers' Association at the Congress of the Federation of Polish Engineers held at Katowice, Poland, on December 1, 2, and 3, when the economic reconstruction of Poland was the subject of a series of papers.

Alginates

Alginates marketed by Albright and Wilson will henceforth be sold in one viscosity grade only. Major S. B. Duncan, manager of the Alginate Department, says this step has been taken to accelerate production. The new alginates will have a viscosity of 30-60 centistokes, and should give satisfactory results in all the usual applications There will be a considerable speed-up of supplies during the next few months, as new plant goes into operation.

Fifty-five Years' Service

Fifty-five years ago Mr. Herbert J. Mills entered the service of G. F. Sutton and Co., London, N. 7, as junior clerk on a month's trial.

On November 1, 1946, he retired from the service of the Company, following a presentation by the office staff whom he controlled for many years. Having served three generations of Suttons, he will be missed by all with whom he came in contact.

Refrigerator Windows

A glass screen giving perfect visibility at a temperature equivalent to 125° frost has been evolved for experimental refrigerating plant by the Triplex Safety Glass Co., Ltd., and constitutes an adaptation of the principle used in aircraft during the war. "Misting up" has been overcome by means of exhaustively dried air enclosed in hollow chambers.

Investigations into Japanese Industry

Teams of the U.S. Technical Industrial Intelligence Department are to be sent by the American Department of Commerce to make investigations into Japanese industry, similar to those undertaken in Germany and Italy, according to a report in *Chemical and Metallurgical Engineering* (May, 1946, p. 100). Enquiries at the Board of Trade have elicited the information that the question of British teams visiting Japan is under consideration, although no indication was given whether there had yet been discussions on the subject between the British and American governments.

One explanation of the delay in starting investigations is that General MacArthur is opposed to any influx into Japan while difficulties of accommodation and feeding remain acute.

Fresh Frozen Foods, Ltd.

Under the title of Fresh Frozen Foods, Ltd., a new company, recently registered, will equip deep sea fishing vessels with quick freezing equipment which will freeze the fish as soon as caught and enable the fishing fleets to remain at sea for longer periods.

Two-thirds of the shares have been subscribed for in cash and one-third have been allotted to Sir C. Dennistoun Burney in payment of the purchase by the company of freezing plant, drawings, designs, and patents in connexion with refrigeration and freezing processes.

Subscribers for the remainder of the capital are Lewis's Royal Polytechnic, Ltd., and the Fairfield Shipbuilding and Engineering Co., Ltd., both of Glasgow. Lewis's Royal Polytechnic, Ltd., is a subsidiary of Lewis's, Ltd., whose chairman is Lord Woolton.

In City circles it is being said that there will follow the financing of the undertaking to the extent of £1,000,000 and subsequently a public issue of capital running into several millions.

Allied Bakeries

At the eleventh annual general meeting of Allied Bakeries, Mr. W. Garfield Weston (the chairman), in the course of his speech said that the directors had been able to increase the dividend on the Ordinary shares to a total of 20 per cent. for the year, against 15 per cent. last year.

Horlicks, Ltd.

It was resolved at the ordinary general meeting of Horlicks, Ltd., Lt.-Col. J. N. Horlick, O.B.E., M.C. (chairman), presiding, that a final dividend of 16¾ per cent. actual, less income tax at 9s. in the £, for the year ended March 31, 1946, be paid to stockholders registered on the books of the company as at September 30, 1946.

National Canning Co., Ltd.

At the fifteenth ordinary general meeting of the National Canning Co., Ltd., Mr. S. W. Smedley, chairman and managing director, said that after making provision for the Preference dividend and transferring £15,000 to reserve, the board recommended the payment of a dividend of 15 per cent. on the Ordinary shares.

Tate and Lyle, Ltd.

In a preliminary statement issued on November 21, 1946, the directors of Tate and Lyle, Ltd., recommended a final dividend of 10 per cent., less tax, on its Ordinary capital for the year ended September 30. With the unchanged interim of 3½ per cent., the total distribution for the period is thus maintained at 13½ per cent. for the eighth successive year.

Groundnuts from East Africa

MISSION'S RECOMMENDATIONS

In late June a team of three experts arrived in Tanganyika to investigate the possibilities of a scheme drawn up in the Colonial Office for a great expansion of groundnut production in the Territory. They have reported that it should be possible to use up to 3,000,000 acres for this important crop—important for both export and for local food supplies.

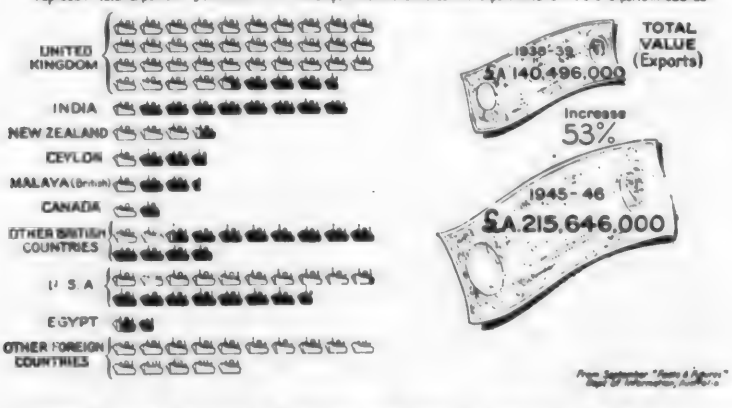
The local people use groundnuts as a staple foodstuff, and they are exported as dessert nuts (peanuts) to Europe and America. The extracted oil amounts to over 40 per cent. of the weight of the nuts themselves, and is an important constituent of margarine, salad oils, and, in the lower grades, soap. They grow well on almost any light soil in tropical and subtropical countries, and take about four and a half months to mature and harvest.

The scheme has repercussions on other questions important to the Territory. Such large-scale planting would involve a good deal of bush-clearing. Much of this bush is infested with tsetse, and this clearing would reduce their ravages enormously, making it possible for the inhabitants to keep cattle in areas hitherto barred. The new plantations would need an extension of railways, which the new mineral development is also making urgent and would possibly involve the Government in the improvement of harbour facilities at Dar es Salaam. The work would be done by Africans under European supervision, and would need complete mechanisation of agricultural method. Quite apart from the value to the territory itself of such a great industry, both in cash returns and in increased food supplies, anything like 3,000,000 planted acres would mean about 250,000,000 extra pounds of margarine a year for Great Britain.

The mission has now recommended that the proposed scheme should be adopted if it could be undertaken with the sense of urgency the position demanded. The need for more oils and fats was so pressing that the work must start early this year if a crop of groundnuts were to be reaped in the 1947-1948 season. The Government have therefore decided to launch the first year's operation on a limited commitment.

AUSTRALIAN EXPORT TRADE

Each black and white ship represents £A2 millions of Australia's total exports for the year 1945-46. White ships represent total exports for year 1938-39. Black ships indicate the increase of exports in 1945-46 over exports in 1938-39



Changes in the direction of Australian export, particularly the increased concentration of exports on Pacific countries, are shown in the illustration. A large part of the increase in exports to other British countries consists of war supplies, and those to the United States arises from exports of gold.

Folic Acid

Member of the B family of vitamins, folic acid is expected soon to be added to cold processed foods, and its amounts closely controlled in frozen foods. Present in green leaves, liver, and yeast, this biologically powerful substance is moderately heat stable in pure form, and has wide uses in medicine. Plans have been made for large scale production. —*Food Industries.*

New Bag-Making Machine

Roto bag-making machines capable of producing up to 12,000 transparent, heat-sealed bags per hour, and now ready for immediate delivery, have been announced by a Flushing engineering firm.

The new machine is said to better by 500 per cent. the hourly output of pre-war models. It also gives promise of soon eliminating the shortage of transparent bags which heretofore have been the production bottleneck of many small packaged items, such as baked goods, candy, and frozen foods.

The roto bag machine manufactures bags with combination heat- and glue-sealed seams. Cellophane—or any other heat-sealable film—feeds from a roll at one end of the machine, and completed bags are ejected at the other end at the rate of 5,000 to 12,000 an hour, depending on the size of the bag.—*Reuter's Trade Service.*

Wrap for Frozen Meats

To its pre-war "Secur-edge" shrouds, manufacture of which in three weights has recently been resumed, the Eagle Beef Cloth Co., of Brooklyn, has added "Fridginette," a sweater weave cotton tubing which is designed to slip over the inner wrapping of poultry, meats, etc., before freezing. The tubing protects the inner wrapping and product from the constant handling to which it may be exposed in locker plants or refrigerators. The inner wrapping is said to eliminate any possibility of drying out because of inner wrap tearing and freezer burn.

Meat Contract

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Used correctly the compound completely obviates dust deposits, which are at once unsightly and which are subject to rapid loss of effectiveness due to absorption of moisture or precipitation of grease. Its residual activity is prolonged.

Although much remains to be done in the research stations and in the manufacture of compounded insecticides, it is stated that, from the data already available, this discovery will prove a powerful new weapon in the fight against insect pests.

Edible Oil Substitutes

Owing to the existing shortage of olive oil in Spain and the resultant high prices, Spanish manufacturers are experimenting with hazelnut and almond oil with a view to producing a substitute material. Many farmers in Catalina have applied for permission to erect small factories for the manufacture of such oils.

Almond oil, owing to its poor quality and high price, has not been able to compete so far with olive oil, but it is hoped that in the course of experiments some useful edible oils may be developed.—*Reuter's Trade Service.*

Citric Acid Plant in Riga

Construction of the first Soviet plant to produce citric acid from molasses has been launched in Riga. This acid will be obtained by fermenting sugar in molasses with a black fungus evolved by means of selection by a Riga engineer-chemist, Valdstein. Valdstein has worked over fifteen years on this problem; he has also worked out the technique of the new production. The plant will produce several score tons of citric acid per year.

Canadian Refrigerator Cars

The instruments shown above and known as "refrigometers" are used on the new Canadian National Railways freight refrigerator cars to record the top and bottom inside temperatures. The employment of this device makes it unnecessary to open the doors to check the efficiency of the interior cooling.

The Canadian National Railways have introduced a new colour scheme for their refrigerator car equipment which includes a brine-resistant and heat-repellent paint which, in addition to the operating benefit and the conservation of ice, will prevent corrosion and add to the life of the car and provide for more efficient refrigeration during extreme hot weather.

Recently one of these cars carried a world's tonnage record by transporting 92,400 lb. of frozen hog livers in a single shipment over the transcontinental route of the Canadian National Railways.

The interior dimensions of the cars are: length, 40 ft.; height, 6 ft. 7 in.; width, 8 ft. 5 in., each being equipped with eight overhead ice bunkers to maintain even car temperature.

Groundnuts from East Africa

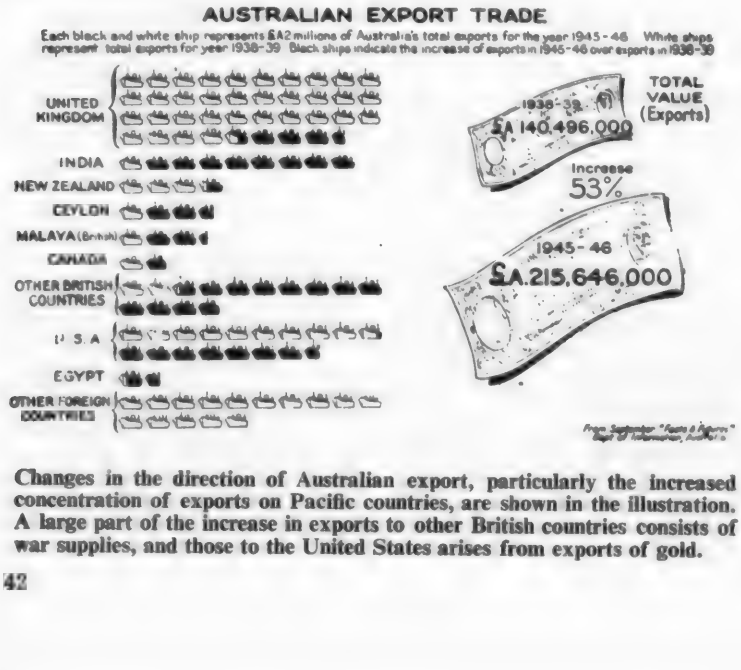
MISSION'S RECOMMENDATIONS

In late June a team of three experts arrived in Tanganyika to investigate the possibilities of a scheme drawn up in the Colonial Office for a great expansion of groundnut production in the Territory. They have reported that it should be possible to use up to 3,000,000 acres for this important crop—important for both export and for local food supplies.

The local people use groundnuts as a staple foodstuff, and they are exported as dessert nuts (peanuts) to Europe and America. The extracted oil amounts to over 40 per cent. of the weight of the nuts themselves, and is an important constituent of margarine, salad oils, and, in the lower grades, soap. They grow well on almost any light soil in tropical and sub-tropical countries, and take about four and a half months to mature and harvest.

The scheme has repercussions on other questions important to the Territory. Such large-scale planting would involve a good deal of bush-clearing. Much of this bush is infested with tsetse, and this clearing would reduce their ravages enormously, making it possible for the inhabitants to keep cattle in areas hitherto barred. The new plantations would need an extension of railways, which the new mineral development is also making urgent and would possibly involve the Government in the improvement of harbour facilities at Dar es Salaam. The work would be done by Africans under European supervision, and would need complete mechanisation of agricultural method. Quite apart from the value to the territory itself of such a great industry, both in cash returns and in increased food supplies, anything like 3,000,000 planted acres would mean about 250,000,000 extra pounds of margarine a year for Great Britain.

The mission has now recommended that the proposed scheme should be adopted if it could be undertaken with the sense of urgency the position demanded. The need for more oils and fats was so pressing that the work must start early this year if a crop of groundnuts were to be reaped in the 1947-1948 season. The Government have therefore decided to launch the first year's operation on a limited commitment.



Changes in the direction of Australian export, particularly the increased concentration of exports on Pacific countries, are shown in the illustration. A large part of the increase in exports to other British countries consists of war supplies, and those to the United States arises from exports of gold.

Folic Acid

Member of the B family of vitamins, folic acid is expected soon to be added to cold processed foods, and its amounts closely controlled in frozen foods. Present in green leaves, liver, and yeast, this biologically powerful substance is moderately heat stable in pure form, and has wide uses in medicine. Plans have been made for large scale production. —*Food Industries.*

New Bag-Making Machine

Roto bag-making machines capable of producing up to 12,000 transparent, heat-sealed bags per hour, and now ready for immediate delivery, have been announced by a Flushing engineering firm.

The new machine is said to better by 500 per cent. the hourly output of pre-war models. It also gives promise of soon eliminating the shortage of transparent bags which heretofore have been the production bottleneck of many small packaged items, such as baked goods, candy, and frozen foods.

The roto bag machine manufactures bags with combination heat- and glue-sealed seams. Cellophane—or any other heat-sealable film—feeds from a roll at one end of the machine, and completed bags are ejected at the other end at the rate of 5,000 to 12,000 an hour, depending on the size of the bag.—*Reuter's Trade Service.*

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Sales of Quick-Frozen Foods

UPWARD TREND FORECAST IN U.S.

"If the U.S. frozen foods industry can get enough supplies and equipment, and protect its quality well enough to perpetuate the insistent demand for its product while the seller's market in food lasts, then public pressure will probably accelerate the economic convulsions to a steady increase in the frozen pack. Whatever happens, frozen foods are undoubtedly in for a period of consolidation among packers." This conclusion sums up a lengthy and comprehensive report by *Fortune* (1946, **34**, 2, p. 182) on the progress of the frozen foods industry since its inception, and on its prospects as a competitor of canning and dehydration.

As a competitor of canned goods, particularly fruits and vegetables, the frozen foods industry has a good deal of leeway to make up. In 1945, it is estimated, only 400,000 tons of quick-frozen foods were sold compared with 6,570,000 tons of canned foods. But it is insisted by enthusiasts that quick-freezing for retail consumption is in for a sharp rise. Frozen fruits and vegetables equal the fresh product in flavour and vitamin content; they are in a more readily marketable form, and there is less spoilage in transport.

It is pointed out that the success of the frozen foods industry depends on the extent to which it restricts processing to those foods for which it can perform an "economic service." The value of freezing consists in making seasonal foods available all the year round, and there is no advantage in freezing, for the sake of increasing the range of frozen products on the market, such vegetable "hardware" as potatoes, cabbage, onions, carrots, apples, and beetroots.

So far, the quick-freezing industry has been built up around a few popular seasonal fruits and vegetables, fish, and meat cuts. The only way in which it can expand its market is to concentrate on retaining the flavour of the original fresh product.

While quick freezing challenges canning and dehydration it is itself threatened by the newly-developed process of "anhydration," and it is claimed that by the beginning of 1947 a new firm will be marketing semi-precooked anhydrous foods which are claimed to retain the flavour, colour, texture, and aroma of the fresh product.

Enlarging on the shortage of equipment, the author points out that refrigeration equipment is needed at every stage: at the processing plant, in packers' warehouses, in transport, for displaying goods in the retailer's shop, and in the consumer's home. The quantity of quick-frozen goods being handled by the retailer is being kept down simply because he has insufficient refrigerated display space. Canned goods, on the other hand, can be stacked in any empty corner. This shortage of refrigeration equipment is encouraging new firms to make huge investments in refrigeration facilities. Others are trying to increase production of refrigerated railway wagons, of which there are about 136,000 in the U.S.A.

A detailed study is given in the article of the structure of the industry and its rapid growth. The pioneer concern is the General Foods Corporation, which in 1929 acquired the interests of the Bird's-Eye Company, founded by the pioneer, Clarence Birdseye. At first engaged only in distributing frozen products, the Bird's-Eye concern started processing when, after the outbreak of war, suppliers began to accept contracts from new outlets and to raise their prices. To break into production Bird's-Eye bought out the Snider Packing Corporation, which was one of the largest tomato sauce producers in the country and had for many years been supplying Bird's-Eye with processed foods. Since 1944 Bird's-Eye has been expanding rapidly and hopes shortly to open a new $4,000,000 plant.

In 1945 Bird's-Eye sold 20 per cent. of the total output of frozen foods and 40 per cent. of the total retail pack.

Biggest rival of Bird's-Eye is the Honor Brand concern, which concentrates solely on processing and hopes soon to be equalling Bird's-Eye in sales. Next in importance comes the C. F. Seabrook Co., of New Jersey, which in 1945 processed $16,000,000-worth of frozen foods. Seabrook is related to Bird's-Eye and was for many years one of General Foods' largest suppliers of frozen foods. The company is fighting to produce its own brand-named products, and present plans include manufacture of frozen precooked meals.

One of the smaller firms which is "determined to give Bird's-Eye and Honor Brand a run for their money" is Pratt's Fresh Frozen Foods, which predicts that by the end of this year it will be producing more than Honor and will manufacture $10,000,000-worth of goods a year. Snowcrop Distributors Inc., owned by four ex-members of the Bird's-Eye management, is another up-and-coming business which hoped to be producing $12,000,000-worth of frozen goods a year by the end of 1946.

Grocers in the U.S.A. are showing increasing interest in sales of frozen foods, and one estimate is that eventually frozen foods may represent 10 per cent. of grocers' sales. At present 40,000 of the 520,000 retail food outlets in the U.S.A. are handling frozen foods.

Unless he has a very large turnover, however, the grocer makes little profit out of frozen food sales, often not enough to pay the rent on his storage equipment and display cabinets. At the same time shops selling nothing but frozen foods are springing up in large cities. Such stores carry many novelties and frozen meals.

A scheme to by-pass food shops completely is in the air. The housewife would buy or rent from a department store a home storage box in which she could keep up to ten days' supply of frozen food.

Trinidad Salted Fish

Salted fish is now being made locally in Trinidad and samples which have been supplied to city merchants have been reported as being very good. The programme of experimental work was begun last year, and has been continued this year with the object of working out processes for the preservation of fish.

Dutch Fish for Britain

Dutch trawlers may unload fish in British ports under a new agreement with the British Ministry of Agriculture. The Netherlands Government requested the resumption of fish exports to Britain, pointing out that the Dutch fishing fleet contributed to Britain's food supply during the war, and that Dutch fish was imported into Britain before the war.—*Reuter.*

German Canned Bread

Tinned bread, which was used extensively by the German army during the war, is claimed to keep for ten years. The bread is reported to be rather heavy and soggy, but to slice well and to have a good flavour. *Dauerbrot*, as it is called, can be placed into tins in the form of doughballs and then baked, or baked first, hermetically sealed in tins, and sterilised.

New Sugar Factories

The West Indies Sugar Company, a subsidiary of Messrs. Tate and Lyle, has announced that it will soon start on the erection of a sugar factory to handle 50,000 tons of sugar. The new factory will cost £1,250,000 and will be built in time to handle the 1949 season crop.—*Reuter.*

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The expansion of Jamaica's sugar industry continues with the announcement that Henriques Bros. are erecting a 10,000-ton factory at Vere Clarendon at a cost of £250,000. It is expected to be in operation in 1948 or 1949. —*Reuter.*

Self-Peeling Casing

A self-peeling casing which retains the natural colour and flavour of liverwurst is being made of Pliofilm, a liquid and moisture-vapour proof packaging material produced by the Goodyear Tyre and Rubber Co. The casing is made by tensilising the Pliofilm to get a circumferential rather than a longitudinal stretch.

The raw product is stuffed into the casing and tied at both ends. On dipping in hot water the tensilised film contracts, hugging the meat tightly. The sausage is then chilled and is ready for market. The use of this method reduces loss of weight, assures uniform taste, size, and capacity, retards spoilage and crusting, and gives a negligible casing weight. The casing is said to uncurl itself when the liverwurst is sliced.

Less Australian Sugar for Britain

Australia's sugar crop prospects have dropped from 725,000 tons to 585,000 tons owing to drought and floods in Queensland, and probably only 98,000 tons will be shipped to England instead of the expected 100,000 tons.

Announcing this, Mr. R. T. Pollard, Australian Minister of Agriculture, said that rationing of tea, sugar, butter, meat, and clothing in Australia would continue during 1947.

Mr. Pollard also announced that Australia's wheat crop was expected to yield 100,000,000 bushels.—*Reuter.*

NEWS FROM THE MINISTRIES

Returnable Containers for Fruit and Vegetables

An Order amending the Fresh Fruit, Vegetables, and Flowers (Use of Containers) Order, 1944, which came into force on November 10, 1946, makes it possible for cotton nets to be treated as reclaimable or returnable containers. Hitherto nets made wholly or mainly from cotton netting and which are largely used for the transport of brussels sprouts have been exempted from the provisions of the Order.

The materials and machinery used to make these nets are also used for making fishing nets, and this year there is a heavy demand for fishing net replacements. In consequence the supply of nets for the carriage of brussels sprouts is very much short of the required number. By making it possible for these nets to be reclaimable or returnable it is hoped to get sufficient back for re-use to make up the deficiency in the number of new nets.

Growers, when packing sprouts, are urged to see that nets are closed in such a manner as to permit them to be readily opened without the use of a knife.

Growers and salesmen are requested to put into operation the machinery provided by article 6 of the Order for reclaimable containers by forwarding to clients a written request for the return of the container and offering payment of a sum reasonably representing its value.

Retailers, when opening nets, are requested to exercise care not to damage them so that they may be in good condition for re-use without repair, and to co-operate in their prompt return to the supplier.

Traders are reminded that it is not permissible to make a deposit charge for reclaimable containers. If it is proposed to make nets returnable and to charge a deposit, a tag bearing the name of the supplier and the amount charged as deposit should be attached to each net.

Appointment and Resignation

Mr. D. C. V. Perrett, formerly an Under-Secretary in the Ministry of Supply, has been appointed Deputy Secretary in his Department in succession to Sir Rolande Wall, who resigned his appointment on December 31, 1946. He will, however, at the Minister's request, undertake a special mission abroad in connexion with procurement arrangements for the Ministry before he rejoins his firm.

Adhesive Supplies

At the request of the Board of Trade, the Ministry of Food have agreed to make reasonable quantities of dextrine available to manufacturers who normally use glue or gelatine. It is hoped that this will help to alleviate the present shortage of glue.

The dextrine will come either from home production, for which the Ministry will allocate ingredients, or from imported supplies.

Manufacturers who can substitute dextrine for glue or gelatine are invited to apply to the Ministry of Food, Starch Division, London Road, Stanmore, for a permit to acquire supplies.

Amendment to the Feeding Stuffs Order

An amendment to the Feeding Stuffs (Regulation of Manufacture) Order, 1944, has been made to provide for the compulsory use of 5 per cent. of animal protein rich substances in National Cattle Food No. 3 and for the inclusion of Cod Liver Oil in National Pig Food No. 1. The new Order came into force on October 28, 1946.

A steady increase in the production of home-produced fish meal has made it possible to raise the animal protein content of all National Pig and Poultry Compounds. The minimum percentage in each case is raised to 7½ per cent.

Increased supplies of wheat by-products are now available, and the minimum percentage of wheat by-products in National Horse Food has been raised to 10 per cent.

Meat for Manufacturing Purposes

A supply of Australian cow ribs and ponies (bone-in) has become available for issue for manufacturing purposes. The authorised wholesale price at which the Wholesale Meat Supply Association will sell these cuts to manufacturers is 6d. per lb.

Raw Materials Guide

A revised Raw Materials Guide has been published by the Board of Trade which sets out all the raw materials controlled by them and by the Ministry of Supply, giving brief details of the types of control in force and the addresses to which any enquiries should be sent. It is obtainable, price 1s. 6d., through any bookseller or newsagent, or direct from H.M. Stationery Office, Kingsway, London, W.C.2, and branches.

Supplies to Manufacturers

On account of the increase in the sweets ration, the Minister of Food has issued a General Licence increasing the amount of sugar confectionery which a manufacturer may obtain, each ration period, for re-manufacture only, without the surrender of personal points to 5 per cent. of the total quantity obtained during the 12 months ended June 30, 1939.

Under the previous General Licence the amount obtainable was 3 per cent. of the 1938-1939 total. The maximum quantity obtainable per ration period remains unaltered at 1 cwt. The increase came into force in Ration Period No. 5 which commenced on November 10, 1946.

Allocations of Raw Cocoa

The International Emergency Food Council has announced an allocation recommendation of cocoa beans for the 4-month period October, 1946, to January, 1947. This recommendation was developed by the Council's Committee on Cocoa and Spices with headquarters in London. The recommendation is expressed in terms of cocoa beans, but covers also imports of cocoa butter and unsweetened chocolate couverture which are converted into cocoa bean equivalent at the rate of 40 tons of cocoa butter or 80 tons of unsweetened chocolate to 100 tons of cocoa beans.

It is contemplated that an allocation recommendation covering the entire year, October, 1946, to September, 1947, will be made early in 1947. The Council also announces the addition of Czechoslovakia, Sweden, and Switzerland to membership in the Committee on Cocoa and Spices bringing the membership of that Committee to fourteen countries having an interest in the international trade of cocoa beans.

Token Imports

Among the goods now added to the list of commodities allowed into the United Kingdom under the Token Imports scheme are:

Glacé cherries,
Quick frozen peas,
Marshmallow (cooking ingredient).

It should be noted that imported quick frozen peas may be distributed only between November 1 and April 30, which is the permitted period for the distribution of the corresponding home product.

The Token Import scheme covers Canada, U.S.A., Belgium, Switzerland, Denmark, France, Sweden, and Holland.

Deep Sea Fishing

Dealing with the great improvements in the results of the fisheries, and especially of the hake fisheries, which took place during the war on the fishing grounds to the south-west of the British Isles, the Ministry of Agriculture and Fisheries have published *The Recovery of a Deep Sea Fishery*, being No. 1, Vol. xvii, of Series II of the Ministry's Fishery Investigations. This improvement is studied in relation to the depressed conditions which prevailed in the years before the war, and the problem of overfishing. The lessons to be drawn from this war-time experience, for maintaining these fisheries at a profitable level, are pointed out.

Information and Advice

Vinegar Strength

B.1416. *We have noticed in some formulae given for products in which vinegar is an ingredient that the strength is expressed in "grains." What does this mean?* (London.)

Originally the method of expressing vinegar strength was in terms of the number of grains of sodium carbonate required to neutralise the acid in one fluid ounce of the vinegar. On this basis, if 4 grains of sodium carbonate were required for one fluid ounce the vinegar would contain slightly more than 1 gram acetic acid per 100 ml., *i.e.* 4 grains is equivalent to 1 per cent., from which it follows that 16 grains is what is now called 4 per cent. acetic acid. In the U.S.A. "grain" has a different arithmetical ratio, and it would appear that 10 U.S.A. grains is equivalent to 1 per cent. of acidity in vinegar. Thus, 100 grain vinegar would be 10 per cent. acid w/v. Incidentally, the use of "grain" measure has almost stopped in this country, but American "grain vinegar" is still widely used. Without doubt the soundest method is per cent., w/v.

Information Supplied

B.1392. *Literature dealing with the manufacture of pre-cooked breakfast cereals.* (London.)

B.1398. *Further details of the cold sterilisation process mentioned in the August issue of* FOOD MANUFACTURE. (Egypt.)

B.1399. *Suppliers of Bacterase used in converting starch into syrups.* (Denmark.)

B.1401. *Manufacturers of table jellies and jelly crystals.* (London.)

B.1402. *Manufacturers of vacuum filling machines suitable for use in connexion with sauces, tomato ketchup, etc.* (Gloucester.)

B.1408. *Manufacturers of wrapping and sealing machinery for packing a commodity similar to butter.* (Northumberland.)

B.1410. *Suppliers of gelatine.* (Eire.)

B.1412. *Manufacturers of a vacuum pan used in the production of tomato paste.* (France.)

B.1413. *Manufacturers of machines for fixing Phoenix bands to 1 lb. and 2 lb. jam jars.* (Worcs.)

B.1414. *Suppliers of a simple apparatus for testing acetic acid strength of artificial vinegar.* (Cornwall.)

B.1415. *Suppliers of stainless steel belts.* (London.)

B.1419. *Firms supplying metal foils for food wrapping.* (Dorset.)

B.1420. *Manufacturers of separators to eliminate non-ferrous and non-metallic substances from grain.* (Yorks.)

B.1421. *Literature dealing with and manufacturers of machinery for the manufacture of jellies, cakes, sweets, etc.* (Eire.)

B.1422. *Details of the manufacture of jelly crystals.* (Isle of Man.)

B.1423. *Manufacturers of machinery for packing flour, pudding powders, etc.* (Belgium.)

B.1424. *Equipment suitable for the preparation of fruit and vegetables prior to quick freezing.* (London.)

B.1425. *Manufacturers producing open top A.L. tall food cans.* (Lancs.)

B.1426. *Suppliers of printed waxed papers for wrapping toffees, etc.* (India.)

B.1429. *Manufacturers of an orange quartering machine.* (South America.)

B.1430. *Details of literature and manufacturers of machinery for the production of dehydrated vegetables.* (London.)

B.1431. *Firms manufacturing electric branding irons suitable for use on wooden cases; also importers of nuts and raisins.* (Lancs.)

B.1432. *Manufacturers of machinery for the production of round peppermint lozenges.* (Canada.)

B.1433. *References to research carried out on preferences of flavours.* (London.)

B.1434. *Suppliers of evaporating plant for making concentrated tomato purée.* (Cambs.)

B.1440. *Makers of oil burners.* (Yorks.)

B.1442. *Manufacturers of machinery to produce 2,000 doughnuts a day.* (London.)

B.1443. *Details of the method of producing shredded beef suet.* (Australia.)

B.1447. *Literature giving the modern procedure of growing asparagus.* (U.S.A.)

B.1448. *Manufacturers of sweetening materials.* (Yorks.)

B.1456. *Firms manufacturing sulphur kilns.* (Belgium.)

B.1457. *Particulars of machinery for packing milk powder in vacuum tins.* (Middx.)

B.1459. *Manufacturers and exporters of cod liver oil.* (Belgium.)

B.1460. *Suppliers of stencilling machines for labels.* (N. Ireland.)

B.1463. *Recipe for a filling cream.* (Lancs.)

B.1464. *Details of manufacturers of modern machinery for the production of potato crisps, mechanical machinery for shaping fish cakes, and a pump for straining frying media.* (Scotland.)

B.1467. *Suppliers of cocks and valves suitable for use at the outlet of a jacketed pan.* (London.)

B.1472. *Recipes for the manufacture of chow chow.* (South Africa.)

B.1476. *Manufacturers of bread slicing machines.* (London.)

B.1477. *Information on the keeping quality of biscuits.* (London.)

Recent Patents

These particulars of new patents of interest to readers have been selected from the "Official Journal of Patents," and are published by permission of the Controller of H.M. Stationery Office. The journal can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).

Specifications Published

Printed copies of the full Published Specifications may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, at the uniform price of 1s. each.

579,696. WALKER, W.: Devices for topping eggs and for similar purposes.
579,761. TRIGGS, W. W. (Bernam Oil Palms, Ltd.): Continuous separation of sludge and water from raw vegetable and animal oils.
579,840. EGERTON, A. C. G., PEARCE, M., and RUHEMANN, M.: Vacuum jacketed containers.
579,895. SPOONER, W. W.: Cooking of alimentary products.
579,908. HOBART MANUFACTURING CO., LTD., and HETHERINGTON, H. R.: Machines for peeling and cleaning vegetables and fruits.
579,943. KEMPSON, P.: Can openers.
579,981. STEVENS, A. H. (General Foods Corporation): Quick-cooking rice products and process of preparing same.
580,054. JENSEN, F. A.: Machine for loading root crops into vehicles or other containers.
580,219. CONSTANTINE, W. W. (General Motors Corporation): Refrigerating apparatus.
580,227. POWER AND SONS, LTD., F. A., PADMORE, J. N., PLATT BROS. AND CO., LTD., and BASSENDALE, I. B.: Automatic tying machines for packages and the like.
580,295. BENNETT, INC.: Can filling machine.

Abstracts of Recent Specifications

Improvements in or relating to the Extraction and Preparation of Agar

This invention consists in improvements in or relating to the extraction and preparation of agar. An object of the invention is to produce agar from seaweeds found particularly on the British coast and similar seaweeds found elsewhere.

The types of seaweed from which agar has been successfully extracted and which are found around the British coast are mainly described as Carrageen Moss, for example, *Gigartina stellata, Chondrus crispus*, and the like, but the invention is not limited to these particular species and it is applicable to all seaweeds from which it is possible to extract agar.

The present invention comprises, in the treatment of seaweed, the steps of first obtaining an aqueous extract from the seaweed by boiling it in a weak alkali solution, separating the resultant liquor and thereafter treating the latter to heat and pressure in an autoclave or equivalent apparatus in the presence of a hydroxide of an alkali metal or of an alkali earth metal.

The extract is itself preferably obtained by heating the weed in water containing a small proportion of calcium hydroxide or the hydroxide of another alkali earth metal.

Thus, in the preferred treatment seaweed is initially subjected to two successive treatments with an alkali hydroxide or a hydroxide of an alkali earth metal, the first treatment being such as to produce an aqueous extract from the seaweed, and the second treatment being carried out under conditions of heat and pressure in order to change the extract into an agar.

Following the treatment of the extract by heat and pressure in the presence of potassium hydroxide or other hydroxide of an alkali or of an alkali earth metal as stated above, agar is finally obtained by neutralising the solution, for instance, with hydrochloric acid or other acid, decolorising the neutral liquid, for instance with charcoal, and thereafter filtering and concentrating the liquid and finally drying the concentrated product thus obtained.

In prior Specification No. 161,612 a process has been described for the treatment of seaweed by boiling with an aqueous solution of acid, salt or alkali which will break down the vegetable tissues and passing the liquid through heated filter presses and subsequently evaporating on heated rollers or concentrating by evaporation and then drying, *e.g.* in a spray drier. No claim is herein made to the preparation of such an extract nor to the subsequent concentration and drying steps *per se*.

577,533. *Joseph Francis Byrne and Philip Steward Powling.*

Trade Marks

The list of trade marks of interest to readers has been selected from the "Official Trade Marks Journal" and is published by permission of the Controller of H.M. Stationery Office. The journal can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).

IRIS.—634,565. Dried fruits. **Rosenberg Bros. and Co.** (a Corporation organised and existing under the laws of the State of California, United States of America), 334, California Street, San Francisco, 6, California, United States of America; Packers and Shippers of Dried Fruits.

MILKAMAC.—641,570. Macaroni; and alimentary pastes being cereal products, all containing milk. **Voile and Wortley, Ltd.,** 50, Bidborough Street, Judd Street, Euston Road, London, W.C. 1; Manufacturers.

COMIL.—641,636. Preparations of milk and chocolate. **Cow and Gate, Ltd.,** Cow and Gate House, Stoke Road, Guildford, Surrey; Dairy Farmers.

WHITE MAGIC.—642,242. Self-raising flour. **William Hodkinson and Sons, Ltd.,** 74, Stuart Street, Manchester, 11, Lancashire; Merchants.

New Companies

Raine's Dairy Products, Limited. (415871.) 112, City Road, E.C.1. Nom. cap.: £2,000 in £1 shares. Dirs.: I. Raine, 8, Overlea Road, E.5; M. Raine, 127a, Coulsdon Road, Coulsdon; H. Raine, 295, Nisbet House, Homerton.

Charles Cleeve and Company, Limited. (415906.) To carry on bus. of agents, brokers, manufacturers of and dealers in all kinds of condensed milk and derivatives of milk of every kind, etc. Nom. cap.: £50,000 in £1 shares. Dirs.: not named. Subs.: C. E. Cleeve, Greville Lodge, Parkhead, Roehampton, S.W.15. (co. dir.); H. Colebrook, Howell Hill Cottage, E. Ewell, Surrey (co. dir.).

Silverson Machines (Sales), Limited. (415969.) 11-12, Finsbury Square, E.C.2. To carry on bus. of dealers in and manufacturers of machinery for the food, ice cream, and allied trades, etc. Nom. cap.: £100 in £1 shares. Dirs.: to be appointed by subs. Subs.: K. J. Mallet, 8, Park Avenue, Ilford (secy.); M. Sellars, 58, Ennismore Avenue, Greenford (clk.).

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